

Report on Drainage Strategy to Accompany Planning Application for Land East of Chipping Lane, Longridge

by

Barratt Manchester

Revision	Date	Prepared By	Revision Notes
A	21.09.21	CD	Calculations revised to suit planning layout PL06 Revision -
B	12.01.22	CD	Inclusion of Phase 1 to model site as a whole
C	30.05.22	CD	Urban Creep section revised

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1. Introduction

The following document has been prepared to assist the designer's preparation and the readers understanding of the drainage theory and calculations in one reference document.

This document covers all Phases 1, 2 & 3 of the Chipping Lane development, in order to demonstrate how the full site drains; supporting evidence has been provided.

2. Site Details

Development Name	Chipping Lane
Site Address	Land off Chipping Lane, Longridge, Preston, PR3 2NA
Longitude, Latitude (or OS Grid Ref)	360321; 437929
Site Description	7 No. open grassed fields separated by mature hedgerows and sporadic trees. Currently used by livestock for grazing.
Site Area (Ha)	14.41Ha approx.
Site Area used for calculating Greenfield Runoff Rates (Ha)	10.52Ha approx. This excludes large areas of open spaces
Existing Impermeable Area (Ha)	0Ha
Is the Site Steeply Sloping (Y/N), If "Yes" Typical Gradient.	Yes 1:30

Table 1

3. Pre-Development Greenfield Runoff Rates (Phase 1)

A flood risk assessment which covers Phase 1 only, was carried out by Betts Hydro, dated March 2016. This document states that the surface water discharge rate should be restricted to 8.3 l/s/Ha, calculated using the ICP SUDS method within MicroDrainage. This FRA and discharge rate was approved under the planning application 3/2017/0232. See Appendix A for the Full Phase 1 report.

Return Period	Greenfield Rate (l/s/Ha)
1 in 1 year (l/s)	7.2
Qbar	8.3
1 in 30 year (l/s)	14.0
1 in 100 year (l/s)	17.2

Table 2

4. Pre-Development Greenfield Runoff Rates (Phases 2 & 3)

A flood risk assessment which covers Phase 2 & 3, was carried out by Betts Hydro, dated December 2018. This document states that the surface water discharge rate should be restricted to 13.6 l/s/Ha, calculated using the HR Wallingford tool for greenfield runoff rates on uksuds.com. This FRA and discharge rate was approved under the planning application 3/2018/0975.

This FRA was revised in November 2021 to include for the new planning layout amendments, for the replan application 3/2021/1134. The drainage strategy and discharge rates emulates the previously approved rate of 13.6 l/s/Ha. See Appendix B for the latest revision of the Full Phases 2 & 3 report.

Return Period	Greenfield Rate (l/s/Ha)
1 in 1 year (l/s)	11.8
Qbar	13.6
1 in 30 year (l/s)	23.1
1 in 100 year (l/s)	28.3

Table 3

5. Soakaway Testing

A site specific site investigation was carried out by soiltechnics dated February 2016. A copy of the site investigation is presented in Appendix D.

Ground conditions are typically 0.3m of topsoil overlaying cohesive Devensian Till to beyond depths of 4.7m. The Till is comprised of initially 1-1.5m of low to high strength clay, below which the shear strength increases. Varying amounts of silt, sand and gravel were also found.

2 No. soakway tests were carried out as part of the site investigation. It was considered that the Devensian Till is impermeable and therefore indicates that infiltration drainage is NOT a feasible option.

6. Post-Development Surface Water Allowable Discharge Rates (All Phases)

Discharge rates have been limited to existing greenfield runoff rates of Qbar for all storm return periods. Please refer to the phase specific FRA, and Tables 2 and 3 above for details of the greenfield runoff rates.

For the Development Area refer to drawing 459/ED/146.

Phase	Developable Area (Ha)	Greenfield Rate (l/s/Ha)	Allowable Discharge Rate (l/s)
1	4.32	8.3	35.9
2A	1.80	13.6	24.5
2B	2.69	13.6	36.6
3	1.71	13.6	23.2
		TOTAL	120.2

Table 4

Phase 2A is to drain into the existing sewers of Phase 1, these have now been combined into one Network 1, so that they can be modelled together.

Surface Water Network	Developable Area (Ha)	Allowable Discharge Rate (l/s)
Network 1	6.12	60.4
Network 3	2.69	36.6
Network 4	1.71	23.2
	TOTAL	120.2

Table 5

7. Design Parameters

M5-60	18.800
Ratio R	0.282
MADD Factor	2.0
Climate Change Allowance	30%
Urban Creep	10%

Table 6

Point of Connection	S14	S325	S415
Engineering Layout Drg No	459/ED/02	459/ED/105	459/ED/105
Proposed Impermeable Areas Drg No	459/ED/04	459/ED/103	459/ED/103
Lowest FFLs	105.175	107.400	111.900
Maximum TWL for Design (Lowest FFL – 0.6m)	104.575	106.800	111.300
Discharge Location Minimum Levels	102.040	106.860	111.120
Surcharge Outfall Levels	102.560	104.400	109.370
Point of Connection	Watercourse		
Point of Connection approved by UU (Y/N)	Yes		

Table 7

8. Summary of Drainage Design

The drainage has been designed in accordance with the site specific FRAs produced by Betts Hydro dated March 2016 & November 2021.

The drainage has also been designed to comply with DEFRA's non-statutory technical standard for sustainable drainage systems dated March 2015. Compliance to such is demonstrated within Section 14.

All surface water networks will drain to the adjacent watercourse named Higgin Brook. Discharge rates have been limited to existing greenfield runoff rates of Q_{bar} for all storm return periods.

Attenuation storage is provided in the form of oversized pipes under highways and public open spaces. Attenuation storage in the highways is sized to provide attenuation for all flows up to and including 1 in 30 year storm events.

For storm events exceeding 1 in 30 year events, long term storage is provided in above ground storage areas to ensure no flooding to properties occurs for all storm events up to and including 1 in 100 year 6 hour storm events plus a 30% allowance for climate change.

An allowance of 30% climate change was approved within the FRAs for planning applications 3/2017/0232 and 3/2018/0975, therefore has been adopted for this small replan application.

MicroDrainage simulations are available in Appendix E and demonstrate the Actual Discharge Rates.

Drainage Network	Allowable Discharge Rate (l/s)	Actual Discharge Rate (l/s)	Difference (l/s)
1	60.3	49.9	-10.4
3	36.6	41.8	5.2
4	23.3	26.4	3.1
Total	120.2	118.1	-2.1

Table 8

9. Urban Creep

When calculating the proposed impermeable areas for the development, an additional 10% has been added to the areas of domestic properties to represent Urban Creep. This 10% has been applied for all phases; and is shown on the impermeable area plans. These increased areas have been used on all pipe codes within MicroDrainage, in order to design and model the system with greater areas of impermeability. The MicroDrainage calculations are found in Appendix E.

10. Design for Exceedance

All surface water drainage models have been modelled for storm events greater than the 1 in 100 year event to determine the impact of flooding. The flood locations are shown on the attached Flood Routing and over land flow drawings. Any exceedance flooding have been demonstrated to be managed within the site where reasonable practicable.

This demonstrates that properties are unlikely to flood during extreme flood events.

11. Maintenance

All surface water (coloured blue) on the attached plans, 459/ED/02 and 459/ED/105, will be put forward for adoption under a Section 104 Agreement with United Utilities. Prior to issue of the Vesting Declaration by United Utilities, the drainage shown on the included plan will be maintainable by Barratt Manchester at the expense of Barratt Manchester.

All areas of public open space will be transferred to the management company for adoption and maintenance. This includes the overflow areas/ponds and culverts to the watercourse on the attached plans 459/ED/02 and 459/ED/105. The management and maintenance will be funded by the purchasers/owners of the development by way of an annual fee levied on the owner. In order to ensure the long term operation of the swales, the maintenance contract will stipulate regular maintenance of the SuDS network, in accordance with the management plan.

All highway gullies and highway drains on the attached plan will be put forward for adoption under a Section 38 agreement with Lancashire County Council. After issue of the highway final certificate, the highways and highway drains, gullies and gully pipes on the attached plans 459/ED/02 and 459/ED/105, will be maintainable by the Local Highway Authority at public expense. Prior to the issue of the final certificate by LCC, the roads and drainage will be maintainable by Barratt Manchester at the expense of Barratt Manchester.

All foul drainage (coloured brown) on the attached plans 459/ED/02 and 459/ED/105 will be put forward for adoption under a S104 agreement with United Utilities. Prior to issue of the Vesting Declaration by United Utilities, the drainage shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

A draft inspection & maintenance schedule for elements of the SuDS/Drainage infrastructure is shown in Table 9.

Drainage Element	Maintenance Requirement	Frequency
Surface Water Pipes and Manholes (prior to adoption)	Inspect. Remove excess silt & debris, Clear Blockage	Inspect Annually. CCTV if required. Silt & debris removed as necessary.
Catchpits	Inspect. Remove excess silt & debris, Clear Blockage	Inspected every 3 months. Silt & debris removed as necessary.
Ditches/Swales	Inspect. Remove excess vegetation. Clear blockages, silt & debris.	Inspected every 1 Month. Blockages, silt & debris removed as necessary.
Flow Controls	Inspect. Remove excess silt & debris, clear blockage. Test functionality of Bypass doors.	Inspect Annually Silt & debris removed as necessary. Flow control repaired, maintained as necessary.
Overflow Ponds (and POS)	Inspect. Remove excess vegetation. Clear blockages, silt & debris.	Inspected monthly, or after significant storm events. Blockages, silt & debris removed as necessary.

Table 9

Culverting sections of the existing watercourse may create or exacerbate upstream or downstream bank and bed erosion as well as sediment deposition, as a result of altered water velocities and disruption to the natural transport of sediment. In order to reduce the effects of erosion we plan to do the following:

- The culvert base matches the existing bed to allow a naturalised culvert bed during high velocity flows
- The culvert width is the same width as the natural channel
- The soffit of the culvert is greater than the 1 in 1000 year water levels
- Culvert alignment matches the alignment of the watercourse
- The slope of the culvert base matched the slope of the existing bed of the watercourse
- No steps provided between end of headwall and the existing bed of the watercourse

Additional headwalls onto existing watercourse can also create or exacerbate bank and bed erosion as well as sediment deposition. In order to reduce the effects of erosion we plan to do the following:

- Flows have been restricted to mimic Qbar greenfield runoff rates, flows will not be increased
- Outfall structure sits flush with the existing bank to prevent turbulent flows
- Headwalls to be located on straight sections of watercourse
- Headwall alignment to be at angle of 45° to minimise change of flow direction
- Outflow pipes of velocity less than 1.2 m/s
- Height between outlet invert and watercourse bed minimised

Screens/grilles are fitted on all headwalls with pipes 375mm or greater. Screens serve two purposes: a trash screen to prevent floating debris and a security screen to restrict access from unauthorised people. Screens are fitted with 100mm spacings between bars so as not to hinder passage of fish and other fauna. The maintenance of screens is safer and easier than clearing potential blockages within the culverts themselves. Maintenance will be in line with that described in Table 6.

12. Defect Reporting

Prior to adoption of the highway drains, foul drains, surface water drains, SuDS and culverts, defects may be reported to Barratt Manchester by the local authority, local residents or members of the public.

All defects can be reported to Barratt Manchester Customer Care line using the following details:

Email: manchester@newhomecare.co.uk

Phone: 0161 872 0161 Option 3

Phone (Out-of-Hours): 0345 601 6084

The customer care line's normal working hours are Monday to Friday 9:00 to 17:30, excluding bank holidays. The out-of-hours line is a 24-hour call service.

After adoption, the following numbers may be useful:

Management Company

POS Landcare Ltd
Hillhouse Business Park,
Thornton Cleveleys,
Lancashire
FY5 4QD
Tel: 01253 897 824

Lancashire County Council Highways

www.lancashire.gov.uk/roads-parking-and-travel/report-it/
Tel: 0300 123 6780 (Mon-Fri 8:00 to 17:00, exc. Bank Holidays)

United Utilities

Tel: 0345 672 3723

Environment Agency

Tel: 0800 80 70 60 (24 Hours)

13. Response Times

All non-urgent defects will be repaired within 10 weeks of being reported.

All urgent defects will be made safe within 48 hours, or sooner if practicable. Any works to 'Make Safe' may be a temporary measure in order to protect the public, and allow sufficient time to procure the permanent remedial works. This may include temporary 'fencing off' of the hazard until permanent remedial works can be completed.

United Utilities, Local Authority, Environment Agency, and the Management Company may operate to alternative response times.

Refer to the site landscape maintenance schedule for further details on the site wide schedule.

14. Compliance with DEFRA's Non-Statutory Technical Standards for Sustainable Drainage Systems dated March 2015

Flood risk outside the development

Criteria	Designers Comments
S1 Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6 below) need not apply.	The surface water discharges to existing watercourse/sewer, therefore this criteria does not apply.

Peak flow control

Criteria	Designers Comments
S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.	All proposed discharge rates are less than or equal to Q_{bar} . Therefore this criteria is deemed to comply.
S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.	The site is greenfield therefore not applicable. Therefore, this criteria is deemed to comply.

Volume control

Criteria	Designers Comments
S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.	As the infiltration test results do not allow infiltration drainage, it is not possible to reduce the run-off volume to the greenfield volume, therefore Criteria S6 will apply.

<p>S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.</p>	<p>The site is Greenfield therefore not applicable.</p>
<p>S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.</p>	<p>As the infiltration test results do not allow infiltration drainage, it is not possible to reduce the run-off volume to the greenfield volume, therefore the discharge rate has been reduced to a maximum of Qbar for all rainfall events up to and including 1 in 100 year 6 hour event.</p>

Flood risk within the development

Criteria	Designers Comments
<p>S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.</p>	<p>The drainage system has been designed to ensure no flooding occurs for any part of the site for a 1 in 30 year event. Micro drainage simulation for a 1 in 30 year event are attached in Appendix D</p>
<p>S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.</p>	<p>The drainage system has been designed to ensure no flooding to properties occurs for any part of the site for a 1 in 100 year 6 Hour event. For flows in excess of the 1 in 30 year event, flows are allowed to overflow into Long Term Storage areas located in public open spaces.</p> <p>Some minor flooding to highways is accepted for the 1 in 100 year 6 hour event. Flooding is only permitted where it can be demonstrated that minor flooded is contained wholly within the adopted highway and will not flood properties. The location and flood extent are shown on the Flood Routing and Overland Flow drawing.</p> <p>Micro drainage simulation for a 1 in 100 year event are attached in Appendix D</p>

<p>S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed</p>	<p>All surface water drainage models have been modelled for storm events greater than the 1 in 100 Year event to determine the impact of flooding. The Flood locations are shown on the attached Flood Routing and over land flow drawing. Any exceedance flooding has been demonstrated to be managed within the site where reasonably practicable.</p>
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Structural integrity

Criteria	Designers Comments
<p>S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.</p>	<p>All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. A 12 month maintenance period is standard with all S104 sewers</p>
<p>S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.</p>	<p>All main sewers to be constructed to adoptable standards.</p> <p>All SUDS to be constructed in accordance with the Typical details as provided.</p>

Designing for maintenance considerations

Criteria	Designers Comments
<p>S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.</p>	<p>Surface Water Pump Stations are not proposed on this development.</p> <p>A Foul ONLY Pump Stations is provided only where it is not possible to drain foul by gravity.</p>

Construction

Criteria	Designers Comments
<p>S13 The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.</p>	<p>All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards.</p> <p>Connection to the ordinary watercourse will require LLFA land drainage consent. Details of the works have been submitted to the LLFA and subsequently approved. No works to within 8m of an ordinary watercourse will be permitted without LLFA approval.</p>

S14 Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.


All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. A 12 month maintenance period is standard with all S104 sewers.

Connection to the ordinary watercourse will require LLFA land drainage consent. Details of the works have been submitted to the LLFA and subsequently approved. No works to within 8m of an ordinary watercourse will be permitted without LLFA consent.

Appendix E

MicroDrainage Simulations

Storm Water Network 1

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Date 01/01/2022	Designed by Corinne Doyle	
File CHIPPINGS LANE PHASE 2 ...	Checked by	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD









FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.800	Add Flow / Climate Change (%)	0
Ratio R	0.281	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits


Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow


















PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.000	34.856	0.087	400.6	0.168	5.00	0.0	0.600	o	1200	Pipe/Conduit		
1.001	14.100	0.028	503.6	0.034	0.00	0.0	0.600	o	1500	Pipe/Conduit		
2.000	26.078	0.153	170.4	0.051	5.00	0.0	0.600	o	225	Pipe/Conduit		
2.001	26.997	0.429	62.9	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit		
2.002	9.581	0.056	171.1	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit		
2.003	30.643	0.361	84.9	0.115	0.00	0.0	0.600	o	225	Pipe/Conduit		
1.002	12.868	0.026	494.9	0.039	0.00	0.0	0.600	o	1500	Pipe/Conduit		
3.000	37.925	0.181	209.5	0.075	5.00	0.0	0.600	o	300	Pipe/Conduit		

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.31	103.006	0.168	0.0	0.0	0.0	1.86	2106.9	22.7
1.001	50.00	5.44	102.619	0.202	0.0	0.0	0.0	1.90	3365.7	27.4
2.000	50.00	5.44	104.865	0.051	0.0	0.0	0.0	1.00	39.7	6.9
2.001	50.00	5.71	104.712	0.067	0.0	0.0	0.0	1.65	65.7	9.1
2.002	50.00	5.87	104.283	0.117	0.0	0.0	0.0	1.00	39.6	15.8
2.003	50.00	6.23	104.226	0.232	0.0	0.0	0.0	1.42	56.5	31.4
1.002	50.00	6.34	102.591	0.473	0.0	0.0	0.0	1.92	3395.2	64.1
3.000	50.00	5.58	103.977	0.075	0.0	0.0	0.0	1.08	76.5	10.2


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Innovyze	Network 2020.1.3	

Network Design Table for Surface Network 1


















PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.001	12.524	0.031	404.0	0.009	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	20.839	0.042	496.2	0.030	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.004	19.697	0.039	505.1	0.049	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.005	11.281	0.023	490.5	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.006	21.474	0.043	499.4	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.007	11.233	0.022	510.6	0.057	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.008	47.046	0.094	500.5	0.094	0.00	0.0	0.600	o	1500	Pipe/Conduit	
4.000	32.098	0.597	53.8	0.044	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	27.069	0.068	398.1	0.084	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.009	39.199	0.080	490.0	0.022	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.010	20.544	0.041	501.1	0.068	0.00	0.0	0.600	o	1500	Pipe/Conduit	
5.000	31.155	0.663	47.0	0.033	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	24.755	0.688	36.0	0.068	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	7.704	0.198	38.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.003	6.655	0.139	47.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	37.767	1.511	25.0	0.054	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	27.458	1.016	27.0	0.068	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.001	50.00	5.79	103.646	0.084	0.0	0.0	0.0	1.01	159.9	11.4
1.003	49.61	6.52	102.565	0.587	0.0	0.0	0.0	1.92	3390.9	78.9
1.004	49.07	6.69	102.523	0.636	0.0	0.0	0.0	1.90	3360.7	84.5
1.005	48.78	6.79	102.484	0.636	0.0	0.0	0.0	1.93	3410.6	84.5
1.006	48.22	6.98	102.461	0.636	0.0	0.0	0.0	1.91	3379.8	84.5
1.007	47.93	7.08	102.418	0.693	0.0	0.0	0.0	1.89	3342.3	90.0
1.008	46.78	7.49	102.396	0.787	0.0	0.0	0.0	1.91	3376.1	99.7
4.000	50.00	5.30	104.242	0.044	0.0	0.0	0.0	1.79	71.1	6.0
4.001	50.00	5.70	103.345	0.128	0.0	0.0	0.0	1.12	241.7	17.3
1.009	45.88	7.83	102.302	0.937	0.0	0.0	0.0	1.93	3412.3	116.4
1.010	45.42	8.00	102.222	1.005	0.0	0.0	0.0	1.91	3374.1	123.6
5.000	50.00	5.27	108.172	0.033	0.0	0.0	0.0	1.91	76.1	4.5
5.001	50.00	5.46	107.509	0.101	0.0	0.0	0.0	2.19	87.0	13.7
5.002	50.00	5.52	106.821	0.101	0.0	0.0	0.0	2.10	83.6	13.7
5.003	50.00	5.58	106.624	0.101	0.0	0.0	0.0	1.90	75.4	13.7
6.000	50.00	5.24	111.159	0.054	0.0	0.0	0.0	2.63	104.5	7.3
6.001	50.00	5.42	109.648	0.122	0.0	0.0	0.0	2.53	100.5	16.5


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Network Design Table for Surface Network 1

















PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
7.000	39.385	0.394	100.0	0.083	5.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	20.526	1.069	19.2	0.121	5.00	0.0	0.600	o	225	Pipe/Conduit	
7.001	47.242	0.304	155.4	0.089	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	26.364	0.195	135.2	0.100	0.00	0.0	0.600	o	750	Pipe/Conduit	
6.002	27.056	0.200	135.3	0.014	0.00	0.0	0.600	o	750	Pipe/Conduit	
6.003	35.837	0.246	145.7	0.092	0.00	0.0	0.600	o	750	Pipe/Conduit	
6.004	20.674	0.056	369.2	0.034	0.00	0.0	0.600	o	750	Pipe/Conduit	
6.005	30.374	0.335	90.7	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
6.006	8.611	0.035	246.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.004	6.888	0.053	130.0	0.045	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.005	30.420	0.317	96.0	0.022	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.006	7.929	0.091	87.1	0.021	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.007	19.595	0.338	58.0	0.033	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.008	12.502	0.272	46.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.009	9.280	0.023	403.5	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.010	11.131	0.028	397.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.011	19.961	0.139	143.6	0.016	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.000	50.00	5.50	108.550	0.083	0.0	0.0	0.0	1.31	52.0	11.2
8.000	50.00	5.11	110.650	0.121	0.0	0.0	0.0	3.00	119.3	16.4
7.001	50.00	6.13	108.081	0.293	0.0	0.0	0.0	1.26	89.0	39.7
7.002	50.00	6.31	107.327	0.393	0.0	0.0	0.0	2.41	1062.6	53.2
6.002	49.68	6.50	107.132	0.529	0.0	0.0	0.0	2.40	1062.2	71.2
6.003	48.88	6.76	106.932	0.621	0.0	0.0	0.0	2.32	1023.4	82.2
6.004	48.17	6.99	106.686	0.655	0.0	0.0	0.0	1.45	640.8	85.5
6.005	47.67	7.17	106.630	0.655	0.0	0.0	0.0	2.94	1298.8	85.5
6.006	47.36	7.28	106.295	0.655	0.0	0.0	0.0	1.29	205.4	85.5
5.004	47.18	7.34	106.260	0.801	0.0	0.0	0.0	1.78	283.4	102.3
5.005	46.51	7.59	106.207	0.823	0.0	0.0	0.0	2.08	330.1	103.7
5.006	46.35	7.65	105.890	0.844	0.0	0.0	0.0	2.18	346.6	105.9
5.007	46.03	7.77	105.799	0.877	0.0	0.0	0.0	2.67	425.3	109.3
5.008	45.85	7.84	105.461	0.877	0.0	0.0	0.0	3.01	477.9	109.3
5.009	45.46	7.99	105.189	0.964	0.0	0.0	0.0	1.01	160.0	118.7
5.010	45.00	8.17	105.166	0.964	0.0	0.0	0.0	1.01	161.2	118.7
5.011	44.52	8.37	105.138	0.980	0.0	0.0	0.0	1.69	269.5	118.7


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Network Design Table for Surface Network 1




PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.012	13.450	0.157	85.7	0.050	0.00	0.0	0.600	o	450	Pipe/Conduit	
9.000	41.859	1.231	34.0	0.052	5.00	0.0	0.600	o	225	Pipe/Conduit	
9.001	39.560	1.364	29.0	0.090	0.00	0.0	0.600	o	225	Pipe/Conduit	
9.002	13.898	0.613	22.7	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.000	25.064	0.135	185.7	0.000	5.00	0.0	0.600	o	375	Pipe/Conduit	
9.003	48.787	1.149	42.5	0.089	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.013	18.119	0.045	402.6	0.011	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.014	27.409	0.069	397.2	0.043	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.015	14.789	0.037	399.7	0.090	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.016	6.471	0.017	380.6	0.011	0.00	0.0	0.600	o	450	Pipe/Conduit	
11.000	24.649	0.325	75.8	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.017	17.659	0.044	401.3	0.015	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.018	66.144	0.165	400.9	0.090	0.00	0.0	0.600	o	525	Pipe/Conduit	
5.019	62.798	0.157	400.0	0.119	0.00	0.0	0.600	o	525	Pipe/Conduit	
5.020	26.670	0.067	398.1	0.035	0.00	0.0	0.600	o	1500	Pipe/Conduit	
5.021	39.257	0.098	400.6	0.000	0.00	0.0	0.600	o	1500	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)
5.012	44.28	8.47	104.999	1.030	0.0	0.0	0.0	2.20	349.5	123.5
9.000	50.00	5.31	108.448	0.052	0.0	0.0	0.0	2.25	89.5	7.0
9.001	50.00	5.58	107.217	0.142	0.0	0.0	0.0	2.44	97.0	19.2
9.002	50.00	5.66	105.853	0.178	0.0	0.0	0.0	2.76	109.7	24.1
10.000	50.00	5.31	105.375	0.000	0.0	0.0	0.0	1.33	146.5	0.0
9.003	50.00	5.96	105.240	0.267	0.0	0.0	0.0	2.79	307.9	36.2
5.013	43.58	8.77	104.016	1.308	0.0	0.0	0.0	1.01	160.2	154.4
5.014	42.58	9.22	103.971	1.351	0.0	0.0	0.0	1.01	161.3	155.8
5.015	42.07	9.47	103.902	1.441	0.0	0.0	0.0	1.01	160.7«	164.2
5.016	41.85	9.57	103.865	1.452	0.0	0.0	0.0	1.04	164.8	164.6
11.000	50.00	5.27	104.399	0.034	0.0	0.0	0.0	1.50	59.8	4.6
5.017	41.26	9.86	103.848	1.501	0.0	0.0	0.0	1.01	160.4«	167.7
5.018	39.40	10.85	103.729	1.591	0.0	0.0	0.0	1.11	240.8	169.8
5.019	37.82	11.79	103.564	1.710	0.0	0.0	0.0	1.11	241.1	175.1
5.020	37.49	12.00	102.432	1.745	0.0	0.0	0.0	2.14	3788.4	177.2
5.021	37.02	12.31	102.365	1.745	0.0	0.0	0.0	2.14	3776.3	177.2


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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.022	34.015	0.085	400.2	0.076	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.011	44.767	0.089	503.0	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.012	8.914	0.053	168.2	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)
5.022	36.62	12.57	102.267	1.821	0.0	0.0	0.0	2.14	3778.3	180.6
1.011	36.05	12.96	102.182	2.826	0.0	0.0	0.0	1.91	3367.6	275.9
1.012	35.88	13.09	102.093	2.826	0.0	0.0	0.0	1.21	85.5<	275.9

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Online Controls for Surface Network 1

Orifice Manhole: S110, DS/PN: 6.006, Volume (m³): 21.1

Diameter (m) 0.247 Discharge Coefficient 0.600 Invert Level (m) 106.295


Hydro-Brake® Optimum Manhole: S13, DS/PN: 1.012, Volume (m³): 92.9

Unit Reference	MD-SHE-0278-5000-2200-5000
Design Head (m)	2.200
Design Flow (l/s)	50.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	278
Invert Level (m)	102.093
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	50.0
Flush-Flo™	0.658	49.9
Kick-Flo®	1.428	40.6
Mean Flow over Head Range	-	43.2

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)
0.100	8.7	1.200	46.4	3.000	58.1	7.000	87.6
0.200	28.7	1.400	41.7	3.500	62.6	7.500	90.6
0.300	45.2	1.600	42.9	4.000	66.7	8.000	93.5
0.400	47.9	1.800	45.4	4.500	70.7	8.500	96.3
0.500	49.3	2.000	47.7	5.000	74.4	9.000	99.0
0.600	49.9	2.200	50.0	5.500	77.9	9.500	101.6
0.800	49.6	2.400	52.1	6.000	81.3		
1.000	48.5	2.600	54.2	6.500	84.5		

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Storage Structures for Surface Network 1

Tank or Pond Manhole: S13, DS/PN: 1.012

Invert Level (m) 103.650

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	947.9	0.200	1029.2	0.400	1113.4	0.600	1200.5
0.100	988.1	0.300	1070.9	0.500	1156.6	0.750	1267.7

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out		Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	
S1	105.233	2.227	Open Manhole	2400	1.000	103.006	1200			
S2	105.924	3.305	Open Manhole	2400	1.001	102.619	1500	1.000	102.919	1200
S15	106.290	1.425	Open Manhole	1350	2.000	104.865	225			
S16	106.358	1.646	Open Manhole	1350	2.001	104.712	225	2.000	104.712	225
S17	105.854	1.571	Open Manhole	1350	2.002	104.283	225	2.001	104.283	225
S18	105.655	1.429	Open Manhole	1500	2.003	104.226	225	2.002	104.227	225
S3	105.961	3.370	Open Manhole	2400	1.002	102.591	1500	1.001	102.591	1500
								2.003	103.865	225
S19	105.531	1.554	Open Manhole	1800	3.000	103.977	300			
S20	105.820	2.174	Open Manhole	1500	3.001	103.646	450	3.000	103.796	300
S4	105.808	3.243	Open Manhole	2700	1.003	102.565	1500	1.002	102.565	1500
								3.001	103.615	450
S5	105.622	3.099	Open Manhole	2400	1.004	102.523	1500	1.003	102.523	1500
S6	105.847	3.363	Open Manhole	2400	1.005	102.484	1500	1.004	102.484	1500
S7	105.909	3.448	Open Manhole	2400	1.006	102.461	1500	1.005	102.461	1500
S8	105.721	3.303	Open Manhole	2400	1.007	102.418	1500	1.006	102.418	1500
S9	105.581	3.185	Open Manhole	2400	1.008	102.396	1500	1.007	102.396	1500
S21	105.667	1.425	Open Manhole	1350	4.000	104.242	225			
S22	105.259	1.914	Open Manhole	1800	4.001	103.345	525	4.000	103.645	225
S10	105.002	2.700	Open Manhole	3000	1.009	102.302	1500	1.008	102.302	1500
								4.001	103.277	525
S11	104.922	2.700	Open Manhole	3000	1.010	102.222	1500	1.009	102.222	1500
S23	109.597	1.425	Open Manhole	1350	5.000	108.172	225			
S24	108.947	1.438	Open Manhole	1500	5.001	107.509	225	5.000	107.509	225
S25	108.247	1.426	Open Manhole	1350	5.002	106.821	225	5.001	106.821	225
S26	108.049	1.426	Open Manhole	1350	5.003	106.624	225	5.002	106.623	225
S105	112.727	1.568	Open Manhole	1500	6.000	111.159	225			
S106	111.782	2.134	Open Manhole	1350	6.001	109.648	225	6.000	109.648	225
S101	110.167	1.617	Open Manhole	1350	7.000	108.550	225			
S102	112.243	1.593	Open Manhole	1500	8.000	110.650	225			
S103	111.709	3.628	Open Manhole	2100	7.001	108.081	300	7.000	108.156	225
								8.000	109.581	225
S104	110.918	3.591	Open Manhole	2400	7.002	107.327	750	7.001	107.777	300
S107	111.491	4.359	Open Manhole	2400	6.002	107.132	750	6.001	108.632	225
								7.002	107.132	750
S108	111.053	4.121	Open Manhole	2400	6.003	106.932	750	6.002	106.932	750
S109	110.539	3.853	Open Manhole	2400	6.004	106.686	750	6.003	106.686	750
S109A	110.009	3.379	Open Manhole	1800	6.005	106.630	750	6.004	106.630	750

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S110	108.200	1.905	Open Manhole	2400	6.006	106.295	450	6.005	106.295	750	
S27	107.924	1.664	Open Manhole	1500	5.004	106.260	450	5.003	106.485	225	
S28	107.857	1.650	Open Manhole	1500	5.005	106.207	450	6.006	106.260	450	
S29	107.540	1.650	Open Manhole	1500	5.006	105.890	450	5.004	106.207	450	
S30	107.449	1.650	Open Manhole	1500	5.007	105.799	450	5.005	105.890	450	
S31	107.646	2.185	Open Manhole	1500	5.008	105.461	450	5.006	105.799	450	
S32	107.569	2.380	Open Manhole	1500	5.009	105.189	450	5.007	105.461	450	
S33	107.430	2.264	Open Manhole	1500	5.010	105.166	450	5.008	105.189	450	
S34	107.241	2.103	Open Manhole	1500	5.011	105.138	450	5.009	105.166	450	
S35	106.909	1.910	Open Manhole	1500	5.012	104.999	450	5.010	105.138	450	
S46	109.881	1.433	Open Manhole	1350	9.000	108.448	225	5.011	104.999	450	
S47	108.671	1.454	Open Manhole	1350	9.001	107.217	225	9.000	107.217	225	
S48	107.297	1.444	Open Manhole	1350	9.002	105.853	225	9.001	105.853	225	
S201	107.005	1.630	Open Manhole	2100	10.000	105.375	375				
S49	106.894	1.654	Open Manhole	1350	9.003	105.240	375	9.002	105.240	225	
S36	106.895	2.879	Open Manhole	1800	5.013	104.016	450	10.000	105.240	375	
S37	106.951	2.980	Open Manhole	1800	5.014	103.971	450	5.012	104.842	450	826
S38	106.608	2.706	Open Manhole	1800	5.015	103.902	450	9.003	104.091	375	
S39	106.386	2.521	Open Manhole	1800	5.016	103.865	450	5.013	103.971	450	
S50	105.824	1.425	Open Manhole	1350	11.000	104.399	225	5.014	103.902	450	
S40	106.262	2.414	Open Manhole	1800	5.017	103.848	450	5.015	103.865	450	
S41	105.972	2.243	Open Manhole	1800	5.018	103.729	525	5.016	103.848	450	
S42	105.729	2.165	Open Manhole	1800	5.019	103.564	525	11.000	104.074	225	1
S43	105.566	3.134	Open Manhole	2700	5.020	102.432	1500	5.017	103.804	450	
S44	105.250	2.885	Open Manhole	2700	5.021	102.365	1500	5.018	103.564	525	
S45	104.968	2.701	Open Manhole	3000	5.022	102.267	1500	5.019	103.407	525	
S12	104.882	2.701	Open Manhole	3000	1.011	102.182	1500	5.020	102.365	1500	
S13	104.793	2.700	Open Manhole	3000	1.012	102.093	300	5.021	102.267	1500	
S14	102.473	0.433	Open Manhole	600		OUTFALL		5.022	102.182	1500	
								1.011	102.093	1500	
								1.012	102.040	300	

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Chipping Lane
 Longridge



Date 01/01/2022
 File CHIPPINGS LANE PHASE 2 ...

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Innovyze Network 2020.1.3

Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	360045.987	438005.971	360045.987	438005.971	Required	
S2	360075.017	437986.678	360075.017	437986.678	Required	
S15	360020.388	437954.416	360020.388	437954.416	Required	
S16	360046.459	437953.809	360046.459	437953.809	Required	
S17	360073.319	437951.095	360073.319	437951.095	Required	
S18	360082.491	437953.866	360082.491	437953.866	Required	
S3	360088.830	437983.846	360088.830	437983.846	Required	
S19	360117.741	438028.822	360117.741	438028.822	Required	
S20	360104.068	437993.447	360104.068	437993.447	Required	
S4	360101.424	437981.205	360101.424	437981.205	Required	
S5	360121.836	437977.010	360121.836	437977.010	Required	
S6	360132.313	437993.689	360132.313	437993.689	Required	
S7	360137.882	438003.500	360137.882	438003.500	Required	
S8	360149.776	438021.379	360149.776	438021.379	Required	
S9	360154.725	438031.463	360154.725	438031.463	Required	

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Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S21	360226.587	438033.057	360226.587	438033.057	Required	
S22	360201.714	438053.346	360201.714	438053.346	Required	
S10	360180.848	438070.590	360180.848	438070.590	Required	
S11	360204.062	438102.176	360204.062	438102.176	Required	
S23	360304.757	437915.600	360304.757	437915.600	Required	
S24	360283.654	437892.680	360283.654	437892.680	Required	
S25	360269.253	437872.545	360269.253	437872.545	Required	
S26	360262.459	437868.913	360262.459	437868.913	Required	
S105	360402.238	437825.920	360402.238	437825.920	Required	
S106	360366.337	437837.645	360366.337	437837.645	Required	
S101	360330.611	437925.095	360330.611	437925.095	Required	
S102	360381.960	437894.730	360381.960	437894.730	Required	
S103	360363.102	437902.834	360363.102	437902.834	Required	
S104	360338.786	437862.331	360338.786	437862.331	Required	
S107	360338.930	437835.967	360338.930	437835.967	Required	

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Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S108	360317.301	437819.712	360317.301	437819.712	Required	
S109	360281.621	437816.363	360281.621	437816.363	Required	
S109A	360276.512	437836.396	360276.512	437836.396	Required	
S110	360259.497	437861.557	360259.497	437861.557	Required	
S27	360255.818	437869.342	360255.818	437869.342	Required	
S28	360249.600	437872.305	360249.600	437872.305	Required	
S29	360226.735	437892.369	360226.735	437892.369	Required	
S30	360223.678	437899.685	360223.678	437899.685	Required	
S31	360237.326	437913.745	360237.326	437913.745	Required	
S32	360244.782	437923.780	360244.782	437923.780	Required	
S33	360245.485	437933.033	360245.485	437933.033	Required	
S34	360238.767	437941.908	360238.767	437941.908	Required	
S35	360224.192	437955.546	360224.192	437955.546	Required	
S46	360322.713	437931.499	360322.713	437931.499	Required	
S47	360295.411	437963.229	360295.411	437963.229	Required	

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Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S48	360270.802	437994.203	360270.802	437994.203	Required	
S201	360276.515	438011.955	360276.515	438011.955	Required	
S49	360257.044	437996.173	360257.044	437996.173	Required	
S36	360217.700	437967.325	360217.700	437967.325	Required	
S37	360201.357	437959.502	360201.357	437959.502	Required	
S38	360176.634	437947.669	360176.634	437947.669	Required	
S39	360162.109	437950.453	360162.109	437950.453	Required	
S50	360135.634	437966.802	360135.634	437966.802	Required	
S40	360156.707	437954.016	360156.707	437954.016	Required	
S41	360168.694	437966.984	360168.694	437966.984	Required	
S42	360226.103	437999.836	360226.103	437999.836	Required	
S43	360266.544	438047.879	360266.544	438047.879	Required	
S44	360268.430	438074.482	360268.430	438074.482	Required	
S45	360239.322	438100.823	360239.322	438100.823	Required	
S12	360212.023	438121.115	360212.023	438121.115	Required	

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Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S13	360176.651	438148.554	360176.651	438148.554	Required	
S14	360175.816	438157.429			No Entry	

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event


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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs		0	Number of Storage Structures
Number of Online Controls		2	Number of Time/Area Diagrams
Number of Offline Controls		0	Number of Real Time Controls

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet 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 Storage Structures 1
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
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 Level (m)
1.000	S1	120 Winter	30	+0%					103.575
1.001	S2	120 Winter	30	+0%					103.575
2.000	S15	15 Winter	30	+0%					104.964
2.001	S16	15 Winter	30	+0%					104.799
2.002	S17	15 Winter	30	+0%	30/15 Summer				104.605
2.003	S18	15 Winter	30	+0%	30/15 Summer				104.555
1.002	S3	120 Winter	30	+0%					103.575
3.000	S19	15 Winter	30	+0%					104.090
3.001	S20	15 Winter	30	+0%					103.794
1.003	S4	120 Winter	30	+0%					103.575
1.004	S5	120 Winter	30	+0%					103.575
1.005	S6	120 Winter	30	+0%					103.575
1.006	S7	120 Winter	30	+0%					103.575
1.007	S8	120 Winter	30	+0%					103.576
1.008	S9	120 Winter	30	+0%					103.576
4.000	S21	15 Winter	30	+0%					104.308
4.001	S22	120 Winter	30	+0%					103.576
1.009	S10	120 Winter	30	+0%					103.576
1.010	S11	120 Winter	30	+0%					103.575
5.000	S23	15 Winter	30	+0%					108.226

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


PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow (l/s)	Overflow (l/s)					
1.000	S1	-0.631	0.000	0.01				17.8	OK	
1.001	S2	-0.544	0.000	0.02				19.6	OK	
2.000	S15	-0.126	0.000	0.39				14.2	OK	
2.001	S16	-0.138	0.000	0.31				18.8	OK	
2.002	S17	0.097	0.000	0.97				31.9	SURCHARGED	
2.003	S18	0.104	0.000	1.14				60.1	SURCHARGED	
1.002	S3	-0.516	0.000	0.04				44.1	OK	
3.000	S19	-0.187	0.000	0.30				21.3	OK	
3.001	S20	-0.302	0.000	0.23				23.8	OK	
1.003	S4	-0.490	0.000	0.03				51.3	OK	
1.004	S5	-0.448	0.000	0.03				49.5	OK	
1.005	S6	-0.409	0.000	0.04				44.2	OK	
1.006	S7	-0.386	0.000	0.02				40.5	OK	
1.007	S8	-0.342	0.000	0.04				39.5	OK	
1.008	S9	-0.320	0.000	0.02				43.8	OK	
4.000	S21	-0.159	0.000	0.19				12.3	OK	
4.001	S22	-0.294	0.000	0.07				13.8	OK	
1.009	S10	-0.226	0.000	0.02				38.7	OK	
1.010	S11	-0.147	0.000	0.02				29.1	OK	
5.000	S23	-0.171	0.000	0.13				9.3	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.001	S24	15 Winter	30	+0%					107.604
5.002	S25	15 Winter	30	+0%					106.931
5.003	S26	15 Winter	30	+0%					106.746
6.000	S105	15 Winter	30	+0%					111.218
6.001	S106	15 Winter	30	+0%					109.745
7.000	S101	15 Winter	30	+0%					108.660
8.000	S102	15 Winter	30	+0%					110.737
7.001	S103	15 Winter	30	+0%					108.327
7.002	S104	15 Winter	30	+0%					107.528
6.002	S107	15 Winter	30	+0%					107.367
6.003	S108	15 Winter	30	+0%					107.261
6.004	S109	15 Winter	30	+0%					107.250
6.005	S109A	15 Winter	30	+0%					107.239
6.006	S110	15 Winter	30	+0%	30/15 Summer				107.227
5.004	S27	15 Winter	30	+0%					106.539
5.005	S28	15 Winter	30	+0%					106.414
5.006	S29	15 Winter	30	+0%					106.180
5.007	S30	15 Winter	30	+0%					105.998
5.008	S31	15 Winter	30	+0%					105.699
5.009	S32	15 Winter	30	+0%	30/15 Summer				105.659
5.010	S33	15 Winter	30	+0%	30/15 Winter				105.616
5.011	S34	15 Winter	30	+0%					105.421
5.012	S35	15 Winter	30	+0%					105.282
9.000	S46	15 Winter	30	+0%					108.511
9.001	S47	15 Winter	30	+0%					107.324
9.002	S48	15 Winter	30	+0%					105.973
10.000	S201	15 Summer	30	+0%					105.375
9.003	S49	15 Winter	30	+0%					105.375
5.013	S36	30 Winter	30	+0%	30/15 Summer				105.032
5.014	S37	30 Winter	30	+0%	30/15 Summer				104.904
5.015	S38	30 Winter	30	+0%	30/15 Summer				104.743
5.016	S39	30 Winter	30	+0%	30/15 Summer				104.587
11.000	S50	15 Winter	30	+0%					104.462
5.017	S40	30 Winter	30	+0%	30/15 Summer				104.435
5.018	S41	30 Winter	30	+0%	30/30 Winter				104.282
5.019	S42	30 Winter	30	+0%	30/30 Winter				104.100
5.020	S43	120 Winter	30	+0%					103.581
5.021	S44	120 Winter	30	+0%					103.580
5.022	S45	120 Winter	30	+0%					103.578
1.011	S12	120 Winter	30	+0%					103.575
1.012	S13	120 Winter	30	+0%	30/15 Summer				103.568

PN	US/MH Name	Surcharged Flooded		Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Time (mins)			
5.001	S24	-0.130	0.000	0.37		29.8	OK	
5.002	S25	-0.115	0.000	0.47		29.7	OK	

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

PN	US/MH Name	Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)				
5.003	S26	-0.103	0.000	0.56			29.5	OK	
6.000	S105	-0.166	0.000	0.15			15.3	OK	
6.001	S106	-0.128	0.000	0.38			35.8	OK	
7.000	S101	-0.115	0.000	0.47			23.1	OK	
8.000	S102	-0.138	0.000	0.32			34.3	OK	
7.001	S103	-0.054	0.000	1.00			83.4	OK	
7.002	S104	-0.549	0.000	0.16			109.9	OK	
6.002	S107	-0.515	0.000	0.21			149.0	OK	
6.003	S108	-0.421	0.000	0.22			168.7	OK	
6.004	S109	-0.186	0.000	0.31			139.9	OK	
6.005	S109A	-0.141	0.000	0.12			112.1	OK	
6.006	S110	0.482	0.000	0.69			94.8	SURCHARGED	
5.004	S27	-0.171	0.000	0.70			118.3	OK	
5.005	S28	-0.243	0.000	0.43			122.3	OK	
5.006	S29	-0.160	0.000	0.74			125.6	OK	
5.007	S30	-0.251	0.000	0.40			131.5	OK	
5.008	S31	-0.212	0.000	0.45			131.5	OK	
5.009	S32	0.020	0.000	1.56			147.3	SURCHARGED	
5.010	S33	0.000	0.000	1.47			146.9	SURCHARGED	
5.011	S34	-0.167	0.000	0.71			148.8	OK	
5.012	S35	-0.167	0.000	0.71			157.5	OK	
9.000	S46	-0.162	0.000	0.17			14.6	OK	
9.001	S47	-0.118	0.000	0.45			41.5	OK	
9.002	S48	-0.105	0.000	0.55			52.2	OK	
10.000	S201	-0.375	0.000	0.00			0.0	OK	
9.003	S49	-0.240	0.000	0.27			77.8	OK	
5.013	S36	0.566	0.000	1.69			204.6	SURCHARGED	
5.014	S37	0.483	0.000	1.53			209.9	SURCHARGED	
5.015	S38	0.391	0.000	2.09			221.8	SURCHARGED	
5.016	S39	0.272	0.000	2.11			223.1	SURCHARGED	
11.000	S50	-0.162	0.000	0.17			9.5	OK	
5.017	S40	0.137	0.000	1.93			229.9	SURCHARGED	
5.018	S41	0.028	0.000	1.07			235.1	SURCHARGED	
5.019	S42	0.011	0.000	1.11			243.2	SURCHARGED	
5.020	S43	-0.351	0.000	0.07			168.6	OK	
5.021	S44	-0.285	0.000	0.06			152.7	OK	
5.022	S45	-0.189	0.000	0.06			135.0	OK	
1.011	S12	-0.107	0.000	0.03			78.5	OK	
1.012	S13	1.175	0.000	0.81			49.8	SURCHARGED	

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event with Surcharged Outfall

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Surcharged Outfall Details for Surface Network 1

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

1.012	S14	102.473	102.040	0.000	600	0
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Datum (m) 102.040 Offset (mins) 0

Time	Depth	Time	Depth	Time	Depth	Time	Depth	Time	Depth	Time	Depth
(mins)	(m)	(mins)	(m)	(mins)	(m)	(mins)	(m)	(mins)	(m)	(mins)	(m)
1	0.520	42	0.520	83	0.520	124	0.520	165	0.520	206	0.520
2	0.520	43	0.520	84	0.520	125	0.520	166	0.520	207	0.520
3	0.520	44	0.520	85	0.520	126	0.520	167	0.520	208	0.520
4	0.520	45	0.520	86	0.520	127	0.520	168	0.520	209	0.520
5	0.520	46	0.520	87	0.520	128	0.520	169	0.520	210	0.520
6	0.520	47	0.520	88	0.520	129	0.520	170	0.520	211	0.520
7	0.520	48	0.520	89	0.520	130	0.520	171	0.520	212	0.520
8	0.520	49	0.520	90	0.520	131	0.520	172	0.520	213	0.520
9	0.520	50	0.520	91	0.520	132	0.520	173	0.520	214	0.520
10	0.520	51	0.520	92	0.520	133	0.520	174	0.520	215	0.520
11	0.520	52	0.520	93	0.520	134	0.520	175	0.520	216	0.520
12	0.520	53	0.520	94	0.520	135	0.520	176	0.520	217	0.520
13	0.520	54	0.520	95	0.520	136	0.520	177	0.520	218	0.520
14	0.520	55	0.520	96	0.520	137	0.520	178	0.520	219	0.520
15	0.520	56	0.520	97	0.520	138	0.520	179	0.520	220	0.520
16	0.520	57	0.520	98	0.520	139	0.520	180	0.520	221	0.520
17	0.520	58	0.520	99	0.520	140	0.520	181	0.520	222	0.520
18	0.520	59	0.520	100	0.520	141	0.520	182	0.520	223	0.520
19	0.520	60	0.520	101	0.520	142	0.520	183	0.520	224	0.520
20	0.520	61	0.520	102	0.520	143	0.520	184	0.520	225	0.520
21	0.520	62	0.520	103	0.520	144	0.520	185	0.520	226	0.520
22	0.520	63	0.520	104	0.520	145	0.520	186	0.520	227	0.520
23	0.520	64	0.520	105	0.520	146	0.520	187	0.520	228	0.520
24	0.520	65	0.520	106	0.520	147	0.520	188	0.520	229	0.520
25	0.520	66	0.520	107	0.520	148	0.520	189	0.520	230	0.520
26	0.520	67	0.520	108	0.520	149	0.520	190	0.520	231	0.520
27	0.520	68	0.520	109	0.520	150	0.520	191	0.520	232	0.520
28	0.520	69	0.520	110	0.520	151	0.520	192	0.520	233	0.520
29	0.520	70	0.520	111	0.520	152	0.520	193	0.520	234	0.520
30	0.520	71	0.520	112	0.520	153	0.520	194	0.520	235	0.520
31	0.520	72	0.520	113	0.520	154	0.520	195	0.520	236	0.520
32	0.520	73	0.520	114	0.520	155	0.520	196	0.520	237	0.520
33	0.520	74	0.520	115	0.520	156	0.520	197	0.520	238	0.520
34	0.520	75	0.520	116	0.520	157	0.520	198	0.520	239	0.520
35	0.520	76	0.520	117	0.520	158	0.520	199	0.520	240	0.520
36	0.520	77	0.520	118	0.520	159	0.520	200	0.520	241	0.520
37	0.520	78	0.520	119	0.520	160	0.520	201	0.520	242	0.520
38	0.520	79	0.520	120	0.520	161	0.520	202	0.520	243	0.520
39	0.520	80	0.520	121	0.520	162	0.520	203	0.520	244	0.520
40	0.520	81	0.520	122	0.520	163	0.520	204	0.520	245	0.520
41	0.520	82	0.520	123	0.520	164	0.520	205	0.520	246	0.520

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Surcharged Outfall Details for Surface Network 1


Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	0.520	266	0.520	285	0.520	304	0.520	323	0.520	342	0.520
248	0.520	267	0.520	286	0.520	305	0.520	324	0.520	343	0.520
249	0.520	268	0.520	287	0.520	306	0.520	325	0.520	344	0.520
250	0.520	269	0.520	288	0.520	307	0.520	326	0.520	345	0.520
251	0.520	270	0.520	289	0.520	308	0.520	327	0.520	346	0.520
252	0.520	271	0.520	290	0.520	309	0.520	328	0.520	347	0.520
253	0.520	272	0.520	291	0.520	310	0.520	329	0.520	348	0.520
254	0.520	273	0.520	292	0.520	311	0.520	330	0.520	349	0.520
255	0.520	274	0.520	293	0.520	312	0.520	331	0.520	350	0.520
256	0.520	275	0.520	294	0.520	313	0.520	332	0.520	351	0.520
257	0.520	276	0.520	295	0.520	314	0.520	333	0.520	352	0.520
258	0.520	277	0.520	296	0.520	315	0.520	334	0.520	353	0.520
259	0.520	278	0.520	297	0.520	316	0.520	335	0.520	354	0.520
260	0.520	279	0.520	298	0.520	317	0.520	336	0.520	355	0.520
261	0.520	280	0.520	299	0.520	318	0.520	337	0.520	356	0.520
262	0.520	281	0.520	300	0.520	319	0.520	338	0.520	357	0.520
263	0.520	282	0.520	301	0.520	320	0.520	339	0.520	358	0.520
264	0.520	283	0.520	302	0.520	321	0.520	340	0.520	359	0.520
265	0.520	284	0.520	303	0.520	322	0.520	341	0.520	360	0.520

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0


Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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


PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.519	0.000	0.01		10.2	OK	
1.001	S2	-0.432	0.000	0.01		10.2	OK	
2.000	S15	-0.126	0.000	0.39		14.2	OK	
2.001	S16	-0.138	0.000	0.31		18.8	OK	
2.002	S17	0.097	0.000	0.97		31.9	SURCHARGED	
2.003	S18	0.104	0.000	1.14		60.1	SURCHARGED	
1.002	S3	-0.404	0.000	0.02		23.1	OK	
3.000	S19	-0.187	0.000	0.30		21.3	OK	
3.001	S20	-0.302	0.000	0.23		23.8	OK	
1.003	S4	-0.378	0.000	0.02		26.6	OK	
1.004	S5	-0.336	0.000	0.02		24.4	OK	
1.005	S6	-0.297	0.000	0.02		19.7	OK	
1.006	S7	-0.274	0.000	0.01		17.1	OK	
1.007	S8	-0.231	0.000	0.02		17.4	OK	
1.008	S9	-0.209	0.000	0.01		18.9	OK	
4.000	S21	-0.159	0.000	0.19		12.3	OK	
4.001	S22	-0.183	0.000	0.04		8.7	OK	
1.009	S10	-0.116	0.000	0.01		25.8	OK	
1.010	S11	-0.038	0.000	0.02		30.7	OK	
5.000	S23	-0.171	0.000	0.13		9.3	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.001	S24	15 Winter	30	+0%					107.604
5.002	S25	15 Winter	30	+0%					106.931
5.003	S26	15 Winter	30	+0%					106.746
6.000	S105	15 Winter	30	+0%					111.218
6.001	S106	15 Winter	30	+0%					109.745
7.000	S101	15 Winter	30	+0%					108.660
8.000	S102	15 Winter	30	+0%					110.737
7.001	S103	15 Winter	30	+0%					108.327
7.002	S104	15 Winter	30	+0%					107.528
6.002	S107	15 Winter	30	+0%					107.367
6.003	S108	15 Winter	30	+0%					107.261
6.004	S109	15 Winter	30	+0%					107.250
6.005	S109A	15 Winter	30	+0%					107.239
6.006	S110	15 Winter	30	+0%	30/15 Summer				107.227
5.004	S27	15 Winter	30	+0%					106.539
5.005	S28	15 Winter	30	+0%					106.414
5.006	S29	15 Winter	30	+0%					106.180
5.007	S30	15 Winter	30	+0%					105.998
5.008	S31	15 Winter	30	+0%					105.699
5.009	S32	15 Winter	30	+0%	30/15 Summer				105.659
5.010	S33	15 Winter	30	+0%	30/15 Winter				105.616
5.011	S34	15 Winter	30	+0%					105.421
5.012	S35	15 Winter	30	+0%					105.282
9.000	S46	15 Winter	30	+0%					108.511
9.001	S47	15 Winter	30	+0%					107.324
9.002	S48	15 Winter	30	+0%					105.973
10.000	S201	15 Summer	30	+0%					105.375
9.003	S49	15 Winter	30	+0%					105.375
5.013	S36	30 Winter	30	+0%	30/15 Summer				105.032
5.014	S37	30 Winter	30	+0%	30/15 Summer				104.904
5.015	S38	30 Winter	30	+0%	30/15 Summer				104.743
5.016	S39	30 Winter	30	+0%	30/15 Summer				104.587
11.000	S50	15 Winter	30	+0%					104.462
5.017	S40	30 Winter	30	+0%	30/15 Summer				104.435
5.018	S41	30 Winter	30	+0%	30/30 Winter				104.282
5.019	S42	30 Winter	30	+0%	30/30 Winter				104.100
5.020	S43	240 Winter	30	+0%					103.704
5.021	S44	240 Winter	30	+0%					103.701
5.022	S45	240 Winter	30	+0%					103.694
1.011	S12	180 Winter	30	+0%					103.682
1.012	S13	180 Winter	30	+0%	30/15 Summer				103.659

PN	US/MH Name	Surcharged Flooded		Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Time (mins)			
5.001	S24	-0.130	0.000	0.37		29.8	OK	
5.002	S25	-0.115	0.000	0.47		29.7	OK	

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

PN	US/MH Name	Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)				
5.003	S26	-0.103	0.000	0.56			29.5	OK	
6.000	S105	-0.166	0.000	0.15			15.3	OK	
6.001	S106	-0.128	0.000	0.38			35.8	OK	
7.000	S101	-0.115	0.000	0.47			23.1	OK	
8.000	S102	-0.138	0.000	0.32			34.3	OK	
7.001	S103	-0.054	0.000	1.00			83.4	OK	
7.002	S104	-0.549	0.000	0.16			109.9	OK	
6.002	S107	-0.515	0.000	0.21			149.0	OK	
6.003	S108	-0.421	0.000	0.22			168.7	OK	
6.004	S109	-0.186	0.000	0.31			139.9	OK	
6.005	S109A	-0.141	0.000	0.12			112.1	OK	
6.006	S110	0.482	0.000	0.69			94.8	SURCHARGED	
5.004	S27	-0.171	0.000	0.70			118.3	OK	
5.005	S28	-0.243	0.000	0.43			122.3	OK	
5.006	S29	-0.160	0.000	0.74			125.6	OK	
5.007	S30	-0.251	0.000	0.40			131.5	OK	
5.008	S31	-0.212	0.000	0.45			131.5	OK	
5.009	S32	0.020	0.000	1.56			147.3	SURCHARGED	
5.010	S33	0.000	0.000	1.47			146.9	SURCHARGED	
5.011	S34	-0.167	0.000	0.71			148.8	OK	
5.012	S35	-0.167	0.000	0.71			157.5	OK	
9.000	S46	-0.162	0.000	0.17			14.6	OK	
9.001	S47	-0.118	0.000	0.45			41.5	OK	
9.002	S48	-0.105	0.000	0.55			52.2	OK	
10.000	S201	-0.375	0.000	0.00			0.0	OK	
9.003	S49	-0.240	0.000	0.27			77.8	OK	
5.013	S36	0.566	0.000	1.69			204.6	SURCHARGED	
5.014	S37	0.483	0.000	1.53			209.9	SURCHARGED	
5.015	S38	0.391	0.000	2.09			221.8	SURCHARGED	
5.016	S39	0.272	0.000	2.11			223.1	SURCHARGED	
11.000	S50	-0.162	0.000	0.17			9.5	OK	
5.017	S40	0.137	0.000	1.93			229.9	SURCHARGED	
5.018	S41	0.028	0.000	1.07			235.1	SURCHARGED	
5.019	S42	0.011	0.000	1.11			243.2	SURCHARGED	
5.020	S43	-0.228	0.000	0.05			114.6	OK	
5.021	S44	-0.164	0.000	0.04			105.0	OK	
5.022	S45	-0.073	0.000	0.04			96.1	OK	
1.011	S12	0.000	0.000	0.03			69.3	OK	
1.012	S13	1.266	0.000	0.81			49.9	SURCHARGED	

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event +30% Climate Change


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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet 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 Storage Structures 1
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

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


Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 30

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	S1	240 Winter	100	+30%					104.072
1.001	S2	240 Winter	100	+30%					104.072
2.000	S15	15 Winter	100	+30%	100/15 Summer				105.304
2.001	S16	15 Winter	100	+30%	100/15 Summer				105.258
2.002	S17	15 Winter	100	+30%	100/15 Summer				105.189
2.003	S18	15 Winter	100	+30%	100/15 Summer				105.093
1.002	S3	240 Winter	100	+30%					104.071
3.000	S19	15 Winter	100	+30%					104.129
3.001	S20	240 Winter	100	+30%					104.071
1.003	S4	240 Winter	100	+30%	100/180 Winter				104.071
1.004	S5	240 Winter	100	+30%	100/120 Winter				104.072
1.005	S6	240 Winter	100	+30%	100/120 Winter				104.072
1.006	S7	240 Winter	100	+30%	100/120 Winter				104.072
1.007	S8	240 Winter	100	+30%	100/120 Winter				104.072
1.008	S9	240 Winter	100	+30%	100/120 Summer				104.072
4.000	S21	15 Winter	100	+30%					104.329
4.001	S22	240 Winter	100	+30%	100/60 Winter				104.072
1.009	S10	240 Winter	100	+30%	100/60 Summer				104.072
1.010	S11	240 Winter	100	+30%	100/30 Winter				104.072
5.000	S23	15 Winter	100	+30%					108.244

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

PN	US/MH Name	Surcharged		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)						
1.000	S1	-0.134	0.000	0.01			16.8	OK	
1.001	S2	-0.047	0.000	0.01			14.9	OK	
2.000	S15	0.214	0.000	0.57			20.8	SURCHARGED	
2.001	S16	0.321	0.000	0.50			30.7	SURCHARGED	
2.002	S17	0.681	0.000	1.39			45.7	SURCHARGED	
2.003	S18	0.642	0.000	1.65			87.3	SURCHARGED	
1.002	S3	-0.020	0.000	0.03			37.5	OK	
3.000	S19	-0.148	0.000	0.50			35.1	OK	
3.001	S20	-0.025	0.000	0.10			9.7	OK	
1.003	S4	0.006	0.000	0.03			46.3	SURCHARGED	
1.004	S5	0.049	0.000	0.03			47.1	SURCHARGED	
1.005	S6	0.088	0.000	0.04			42.6	SURCHARGED	
1.006	S7	0.111	0.000	0.02			40.6	SURCHARGED	
1.007	S8	0.154	0.000	0.04			41.7	SURCHARGED	
1.008	S9	0.176	0.000	0.02			48.9	SURCHARGED	
4.000	S21	-0.138	0.000	0.31			20.7	OK	
4.001	S22	0.202	0.000	0.07			14.3	SURCHARGED	
1.009	S10	0.270	0.000	0.02			55.5	SURCHARGED	
1.010	S11	0.350	0.000	0.03			56.7	SURCHARGED	
5.000	S23	-0.153	0.000	0.22			15.6	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
5.001	S24	15 Winter	100	+30%				
5.002	S25	15 Winter	100	+30%				
5.003	S26	15 Winter	100	+30%				
6.000	S105	15 Winter	100	+30%				
6.001	S106	15 Winter	100	+30%				
7.000	S101	15 Winter	100	+30%	100/15	Summer		
8.000	S102	15 Winter	100	+30%				
7.001	S103	15 Winter	100	+30%	100/15	Summer		
7.002	S104	30 Winter	100	+30%				
6.002	S107	30 Winter	100	+30%	100/30	Winter		
6.003	S108	30 Winter	100	+30%	100/15	Winter		
6.004	S109	30 Winter	100	+30%	100/15	Summer		
6.005	S109A	30 Winter	100	+30%	100/15	Summer		
6.006	S110	30 Winter	100	+30%	100/15	Summer		
5.004	S27	30 Winter	100	+30%	100/30	Winter		
5.005	S28	30 Winter	100	+30%	100/30	Winter		
5.006	S29	30 Winter	100	+30%	100/15	Winter		
5.007	S30	30 Winter	100	+30%	100/15	Winter		
5.008	S31	30 Winter	100	+30%	100/15	Summer		
5.009	S32	30 Winter	100	+30%	100/15	Summer		
5.010	S33	30 Winter	100	+30%	100/15	Summer		
5.011	S34	30 Winter	100	+30%	100/15	Summer		
5.012	S35	30 Winter	100	+30%	100/15	Summer		
9.000	S46	15 Winter	100	+30%				
9.001	S47	15 Winter	100	+30%				
9.002	S48	30 Winter	100	+30%	100/30	Winter		
10.000	S201	30 Winter	100	+30%	100/15	Winter		
9.003	S49	30 Winter	100	+30%	100/15	Winter		
5.013	S36	30 Winter	100	+30%	100/15	Summer		
5.014	S37	30 Winter	100	+30%	100/15	Summer		
5.015	S38	30 Winter	100	+30%	100/15	Summer		
5.016	S39	30 Winter	100	+30%	100/15	Summer		
11.000	S50	30 Winter	100	+30%	100/15	Summer		
5.017	S40	30 Winter	100	+30%	100/15	Summer		
5.018	S41	30 Winter	100	+30%	100/15	Summer		
5.019	S42	30 Winter	100	+30%	100/15	Summer		
5.020	S43	240 Winter	100	+30%	100/120	Winter		
5.021	S44	240 Winter	100	+30%	100/60	Winter		
5.022	S45	240 Winter	100	+30%	100/60	Summer		
1.011	S12	240 Winter	100	+30%	100/30	Winter		
1.012	S13	240 Winter	100	+30%	100/15	Summer		

PN	US/MH Name	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Half Drain Time	Pipe Flow	Status
		(m)	(m)	(m ³)	Cap. (l/s)	(mins)	(l/s)	
5.001	S24	107.639	-0.095	0.000	0.62		50.0	OK
5.002	S25	106.975	-0.071	0.000	0.79		49.8	OK

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Chipping Lane
 Longridge



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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
5.003	S26	106.798	-0.051	0.000	0.94		49.4	OK
6.000	S105	111.237	-0.147	0.000	0.26		25.7	OK
6.001	S106	109.780	-0.093	0.000	0.64		60.0	OK
7.000	S101	109.009	0.234	0.000	0.75		36.8	SURCHARGED
8.000	S102	110.768	-0.107	0.000	0.53		57.6	OK
7.001	S103	108.787	0.406	0.000	1.53		128.1	SURCHARGED
7.002	S104	107.942	-0.135	0.000	0.21		146.3	OK
6.002	S107	107.932	0.050	0.000	0.26		183.6	SURCHARGED
6.003	S108	107.917	0.235	0.000	0.24		185.8	SURCHARGED
6.004	S109	107.899	0.463	0.000	0.32		143.9	SURCHARGED
6.005	S109A	107.884	0.504	0.000	0.15		135.5	SURCHARGED
6.006	S110	107.867	1.122	0.000	0.97		133.5	SURCHARGED
5.004	S27	106.755	0.045	0.000	1.00		168.8	SURCHARGED
5.005	S28	106.712	0.055	0.000	0.61		172.5	SURCHARGED
5.006	S29	106.605	0.265	0.000	1.01		170.9	SURCHARGED
5.007	S30	106.555	0.306	0.000	0.54		177.5	SURCHARGED
5.008	S31	106.461	0.550	0.000	0.61		180.3	SURCHARGED
5.009	S32	106.393	0.754	0.000	2.02		190.8	SURCHARGED
5.010	S33	106.284	0.668	0.000	1.93		193.0	SURCHARGED
5.011	S34	106.176	0.588	0.000	0.94		196.7	SURCHARGED
5.012	S35	106.064	0.615	0.000	0.92		204.7	SURCHARGED
9.000	S46	108.531	-0.142	0.000	0.29		24.5	OK
9.001	S47	107.366	-0.076	0.000	0.76		69.6	OK
9.002	S48	106.161	0.083	0.000	0.75		71.3	SURCHARGED
10.000	S201	106.003	0.253	0.000	0.04		5.0	SURCHARGED
9.003	S49	106.006	0.391	0.000	0.34		96.5	SURCHARGED
5.013	S36	105.942	1.476	0.000	2.17		262.2	SURCHARGED
5.014	S37	105.725	1.304	0.000	1.98		271.0	SURCHARGED
5.015	S38	105.457	1.105	0.000	2.71		288.5	SURCHARGED
5.016	S39	105.194	0.879	0.000	2.75		291.1	SURCHARGED
11.000	S50	104.949	0.325	0.000	0.22		12.0	SURCHARGED
5.017	S40	104.929	0.631	0.000	2.54		302.4	SURCHARGED
5.018	S41	104.645	0.391	0.000	1.45		318.9	SURCHARGED
5.019	S42	104.294	0.205	0.000	1.56		342.6	SURCHARGED
5.020	S43	104.074	0.142	0.000	0.08		190.8	SURCHARGED
5.021	S44	104.073	0.208	0.000	0.07		185.9	SURCHARGED
5.022	S45	104.073	0.306	0.000	0.08		186.8	SURCHARGED
1.011	S12	104.072	0.390	0.000	0.10		228.5	SURCHARGED
1.012	S13	104.071	1.678	0.000	0.81		49.9	SURCHARGED

PN	US/MH Name	Level Exceeded
5.001	S24	
5.002	S25	
5.003	S26	
6.000	S105	

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

PN	US/MH Name	Level Exceeded
6.001	S106	
7.000	S101	
8.000	S102	
7.001	S103	
7.002	S104	
6.002	S107	
6.003	S108	
6.004	S109	
6.005	S109A	
6.006	S110	
5.004	S27	
5.005	S28	
5.006	S29	
5.007	S30	
5.008	S31	
5.009	S32	
5.010	S33	
5.011	S34	
5.012	S35	
9.000	S46	
9.001	S47	
9.002	S48	
10.000	S201	
9.003	S49	
5.013	S36	
5.014	S37	
5.015	S38	
5.016	S39	
11.000	S50	
5.017	S40	
5.018	S41	
5.019	S42	
5.020	S43	
5.021	S44	
5.022	S45	
1.011	S12	
1.012	S13	

Storm Water Network 3

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 3










Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.800	Add Flow / Climate Change (%)	0
Ratio R	0.281	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits


Network Design Table for Surface Network 3

« - Indicates pipe capacity < flow
















PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.574	0.113	164.4	0.129	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	21.020	0.127	165.5	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	38.591	0.234	164.9	0.082	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	20.496	0.637	32.2	0.052	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	20.288	0.630	32.2	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	33.160	1.079	30.7	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	32.000	0.905	35.4	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	18.105	0.540	33.5	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	21.220	0.633	33.5	0.055	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.30	113.750	0.129	0.0	0.0	0.0	1.02	40.4	17.5
1.001	50.00	5.65	113.637	0.152	0.0	0.0	0.0	1.01	40.3	20.6
1.002	50.00	6.18	113.435	0.234	0.0	0.0	0.0	1.22	86.3	31.7
2.000	50.00	5.15	115.622	0.052	0.0	0.0	0.0	2.31	92.0	7.0
2.001	50.00	5.29	114.985	0.099	0.0	0.0	0.0	2.31	92.0	13.4
2.002	50.00	5.53	114.355	0.127	0.0	0.0	0.0	2.37	94.2	17.2
1.003	50.00	6.38	113.201	0.445	0.0	0.0	0.0	2.65	187.5	60.3
1.004	49.71	6.49	112.296	0.476	0.0	0.0	0.0	2.72	192.6	64.1
1.005	49.30	6.62	111.756	0.531	0.0	0.0	0.0	2.72	192.6	70.9

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Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.006	26.149	0.972	26.9	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	14.101	0.463	30.5	0.032	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	66.749	1.420	47.0	0.081	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	11.314	0.343	33.0	0.089	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	75.598	2.291	33.0	0.107	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	19.351	0.586	33.0	0.150	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	20.774	0.472	44.0	0.094	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	31.984	0.727	44.0	0.024	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.002	15.379	0.349	44.1	0.087	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.011	9.311	0.023	404.8	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
5.000	33.973	0.085	399.7	0.120	5.00	0.0	0.600	o	1500	Pipe/Conduit	
5.001	19.633	0.049	400.7	0.096	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.012	62.392	0.156	399.9	0.058	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.013	17.480	0.044	397.3	0.054	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.014	12.998	0.078	166.6	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)
1.006	48.86	6.76	111.123	0.561	0.0	0.0	0.0	3.04	215.1	74.2
1.007	48.67	6.82	110.001	0.593	0.0	0.0	0.0	3.69	587.6	78.2
3.000	50.00	5.58	112.437	0.081	0.0	0.0	0.0	1.91	76.1	11.0
1.008	48.51	6.88	109.538	0.763	0.0	0.0	0.0	3.55	564.5	100.2
1.009	47.48	7.23	109.194	0.870	0.0	0.0	0.0	3.55	564.4	111.9
1.010	47.23	7.32	105.438	1.020	0.0	0.0	0.0	3.55	564.2	130.5
4.000	50.00	5.23	109.677	0.094	0.0	0.0	0.0	1.52	26.9	12.7
4.001	50.00	5.58	107.728	0.118	0.0	0.0	0.0	1.52	26.9	16.0
4.002	50.00	5.75	105.501	0.205	0.0	0.0	0.0	1.52	26.9<	27.8
1.011	47.02	7.40	103.802	1.225	0.0	0.0	0.0	2.13	3756.4	156.0
5.000	50.00	5.26	103.912	0.120	0.0	0.0	0.0	2.14	3780.6	16.2
5.001	50.00	5.42	103.827	0.216	0.0	0.0	0.0	2.14	3775.9	29.2
1.012	45.73	7.88	103.778	1.499	0.0	0.0	0.0	2.14	3779.3	185.7
1.013	45.39	8.02	103.622	1.553	0.0	0.0	0.0	2.15	3792.1	190.9
1.014	44.85	8.23	103.578	1.553	0.0	0.0	0.0	1.01	40.2<	190.9

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Online Controls for Surface Network 3

Depth/Flow Relationship Manhole: S324, DS/PN: 1.014, Volume (m³): 48.8

Invert Level (m) 103.578

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.9700	0.800	34.6400	2.000	33.5200	3.800	46.2000
0.200	17.9600	1.000	32.1700	2.200	35.1600	4.200	48.5800
0.300	26.1200	1.200	30.5300	2.400	36.7200	4.600	50.8400
0.400	31.6700	1.400	29.7200	2.600	38.2200	5.000	53.0000
0.500	34.7400	1.600	29.9800	3.000	41.0500		
0.600	35.8600	1.800	31.8000	3.400	43.7000		

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Storage Structures for Surface Network 3

Tank or Pond Manhole: S324, DS/PN: 1.014

Invert Level (m) 106.350

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	451.4	0.800	1004.1

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Manhole Schedules for Surface Network 3

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out		Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	
S301	116.010	2.260	Open Manhole	1800	1.000	113.750	225			
S302	115.684	2.047	Open Manhole	1800	1.001	113.637	225	1.000	113.637	225
S303	115.415	1.980	Open Manhole	1800	1.002	113.435	300	1.001	113.510	225
S304	117.197	1.575	Open Manhole	1350	2.000	115.622	225			
S305	116.721	1.736	Open Manhole	1350	2.001	114.985	225	2.000	114.985	225
S306	116.084	1.729	Open Manhole	1350	2.002	114.355	225	2.001	114.355	225
S307	115.067	1.866	Open Manhole	1800	1.003	113.201	300	1.002	113.201	300
								2.002	113.276	225
S308	114.042	1.746	Open Manhole	1350	1.004	112.296	300	1.003	112.296	300
S309	113.576	1.820	Open Manhole	1350	1.005	111.756	300	1.004	111.756	300
S310	113.216	2.093	Open Manhole	1350	1.006	111.123	300	1.005	111.123	300
S311	113.012	3.011	Open Manhole	1500	1.007	110.001	450	1.006	110.151	300
S312	114.027	1.590	Open Manhole	1500	3.000	112.437	225			
S313	113.198	3.660	Open Manhole	1800	1.008	109.538	450	1.007	109.538	450
								3.000	111.017	225
S314	112.916	3.722	Open Manhole	1800	1.009	109.194	450	1.008	109.195	450
S315	111.041	5.603	Open Manhole	1800	1.010	105.438	450	1.009	106.903	450
S316	111.170	1.493	Open Manhole	1350	4.000	109.677	150			
S317	110.773	3.045	Open Manhole	1200	4.001	107.728	150	4.000	109.205	150
S318	110.263	4.762	Open Manhole	1350	4.002	105.501	150	4.001	107.001	150
S319	110.208	6.406	Open Manhole	3000	1.011	103.802	1500	1.010	104.852	450
								4.002	105.152	150
S320	109.345	5.433	Open Manhole	3000	5.000	103.912	1500			
S321	109.856	6.029	Open Manhole	3000	5.001	103.827	1500	5.000	103.827	1500
S322	109.780	6.002	Open Manhole	3000	1.012	103.778	1500	1.011	103.779	1500
								5.001	103.778	1500
S323	107.270	3.648	Open Manhole	3000	1.013	103.622	1500	1.012	103.622	1500
S324	106.860	3.282	Open Manhole	3000	1.014	103.578	225	1.013	103.578	1500
S325	103.900	0.400	Open Manhole	0		OUTFALL		1.014	103.500	225

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S301	360511.561	437893.841	360511.561	437893.841	Required	



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Manhole Schedules for Surface Network 3

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S302	360496.828	437882.530	360496.828	437882.530	Required	
S303	360484.705	437865.358	360484.705	437865.358	Required	
S304	360540.687	437834.207	360540.687	437834.207	Required	
S305	360524.091	437822.179	360524.091	437822.179	Required	
S306	360503.953	437819.724	360503.953	437819.724	Required	
S307	360472.084	437828.889	360472.084	437828.889	Required	
S308	360441.293	437837.603	360441.293	437837.603	Required	
S309	360429.491	437851.332	360429.491	437851.332	Required	
S310	360424.950	437872.060	360424.950	437872.060	Required	
S311	360414.973	437896.231	360414.973	437896.231	Required	
S312	360465.454	437958.539	360465.454	437958.539	Required	
S313	360426.523	437904.320	360426.523	437904.320	Required	
S314	360420.446	437913.864	360420.446	437913.864	Required	
S315	360379.843	437977.633	360379.843	437977.633	Required	
S316	360422.942	438021.553	360422.942	438021.553	Required	

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Manhole Schedules for Surface Network 3

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S317	360402.923	438016.002	360402.923	438016.002	Required	
S318	360374.989	438000.425	360374.989	438000.425	Required	
S319	360364.390	437989.281	360364.390	437989.281	Required	
S320	360314.485	437963.005	360314.485	437963.005	Required	
S321	360343.099	437981.320	360343.099	437981.320	Required	
S322	360357.105	437995.079	360357.105	437995.079	Required	
S323	360316.597	438042.533	360316.597	438042.533	Required	
S324	360305.768	438056.255	360305.768	438056.255	Required	
S325	360295.300	438063.960			No Entry	

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event

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Simulation Criteria for Surface Network 3

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.800 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, 2160, 2880, 4320, 5760,
 7200, 8640, 10080
 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 Level (m)
1.000	S301	15 Winter	30	+0%	30/15 Winter				113.980
1.001	S302	15 Winter	30	+0%	30/15 Summer				113.878
1.002	S303	15 Winter	30	+0%					113.634
2.000	S304	15 Winter	30	+0%					115.686
2.001	S305	15 Winter	30	+0%					115.077
2.002	S306	15 Winter	30	+0%					114.458
1.003	S307	15 Winter	30	+0%					113.390
1.004	S308	15 Winter	30	+0%					112.499
1.005	S309	15 Winter	30	+0%					111.973
1.006	S310	15 Winter	30	+0%					111.328
1.007	S311	15 Winter	30	+0%					110.205
3.000	S312	15 Winter	30	+0%					112.524
1.008	S313	15 Winter	30	+0%					109.800
1.009	S314	15 Winter	30	+0%					109.405
1.010	S315	15 Winter	30	+0%					105.701
4.000	S316	15 Winter	30	+0%	30/15 Winter				109.837
4.001	S317	15 Winter	30	+0%	30/15 Summer				108.213
4.002	S318	15 Winter	30	+0%	30/15 Summer				106.824
1.011	S319	120 Winter	30	+0%	30/120 Winter				105.336
5.000	S320	120 Winter	30	+0%					105.336

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow (l/s)	Overflow (l/s)					
1.000	S301	0.005	0.000	0.95			34.5	SURCHARGED		
1.001	S302	0.016	0.000	1.08			39.4	SURCHARGED		
1.002	S303	-0.101	0.000	0.76			60.5	OK		
2.000	S304	-0.161	0.000	0.18			14.7	OK		
2.001	S305	-0.133	0.000	0.35			28.9	OK		
2.002	S306	-0.122	0.000	0.42			37.2	OK		
1.003	S307	-0.111	0.000	0.70			119.8	OK		
1.004	S308	-0.097	0.000	0.78			129.0	OK		
1.005	S309	-0.083	0.000	0.86			144.5	OK		
1.006	S310	-0.095	0.000	0.79			152.9	OK		
1.007	S311	-0.246	0.000	0.42			161.4	OK		
3.000	S312	-0.138	0.000	0.31			22.8	OK		
1.008	S313	-0.188	0.000	0.63			208.0	OK		
1.009	S314	-0.239	0.000	0.45			235.6	OK		
1.010	S315	-0.187	0.000	0.64			274.4	OK		
4.000	S316	0.010	0.000	1.01			25.7	SURCHARGED		
4.001	S317	0.335	0.000	1.21			31.2	SURCHARGED		
4.002	S318	1.173	0.000	2.07			51.3	SURCHARGED		
1.011	S319	0.034	0.000	0.10			127.1	SURCHARGED		
5.000	S320	-0.076	0.000	0.00			8.4	OK		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.001	S321	120	Winter	30	+0%	30/120	Winter		105.335
1.012	S322	120	Winter	30	+0%	30/120	Winter		105.336
1.013	S323	120	Winter	30	+0%	30/60	Winter		105.334
1.014	S324	120	Winter	30	+0%	30/15	Summer		105.334

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	S321	0.008	0.000	0.01		10.9	SURCHARGED	
1.012	S322	0.058	0.000	0.03		96.8	SURCHARGED	
1.013	S323	0.212	0.000	0.03		49.4	SURCHARGED	
1.014	S324	1.531	0.000	1.03		35.6	SURCHARGED	

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event with Surcharged Outfall

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Surcharged Outfall Details for Surface Network 3

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

1.014	S325	103.900	103.500	103.500	0 0
-------	------	---------	---------	---------	-----

Datum (m) 103.400 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)
1	1.000	42	1.000	83	1.000	124	1.000	165	1.000	206	1.000
2	1.000	43	1.000	84	1.000	125	1.000	166	1.000	207	1.000
3	1.000	44	1.000	85	1.000	126	1.000	167	1.000	208	1.000
4	1.000	45	1.000	86	1.000	127	1.000	168	1.000	209	1.000
5	1.000	46	1.000	87	1.000	128	1.000	169	1.000	210	1.000
6	1.000	47	1.000	88	1.000	129	1.000	170	1.000	211	1.000
7	1.000	48	1.000	89	1.000	130	1.000	171	1.000	212	1.000
8	1.000	49	1.000	90	1.000	131	1.000	172	1.000	213	1.000
9	1.000	50	1.000	91	1.000	132	1.000	173	1.000	214	1.000
10	1.000	51	1.000	92	1.000	133	1.000	174	1.000	215	1.000
11	1.000	52	1.000	93	1.000	134	1.000	175	1.000	216	1.000
12	1.000	53	1.000	94	1.000	135	1.000	176	1.000	217	1.000
13	1.000	54	1.000	95	1.000	136	1.000	177	1.000	218	1.000
14	1.000	55	1.000	96	1.000	137	1.000	178	1.000	219	1.000
15	1.000	56	1.000	97	1.000	138	1.000	179	1.000	220	1.000
16	1.000	57	1.000	98	1.000	139	1.000	180	1.000	221	1.000
17	1.000	58	1.000	99	1.000	140	1.000	181	1.000	222	1.000
18	1.000	59	1.000	100	1.000	141	1.000	182	1.000	223	1.000
19	1.000	60	1.000	101	1.000	142	1.000	183	1.000	224	1.000
20	1.000	61	1.000	102	1.000	143	1.000	184	1.000	225	1.000
21	1.000	62	1.000	103	1.000	144	1.000	185	1.000	226	1.000
22	1.000	63	1.000	104	1.000	145	1.000	186	1.000	227	1.000
23	1.000	64	1.000	105	1.000	146	1.000	187	1.000	228	1.000
24	1.000	65	1.000	106	1.000	147	1.000	188	1.000	229	1.000
25	1.000	66	1.000	107	1.000	148	1.000	189	1.000	230	1.000
26	1.000	67	1.000	108	1.000	149	1.000	190	1.000	231	1.000
27	1.000	68	1.000	109	1.000	150	1.000	191	1.000	232	1.000
28	1.000	69	1.000	110	1.000	151	1.000	192	1.000	233	1.000
29	1.000	70	1.000	111	1.000	152	1.000	193	1.000	234	1.000
30	1.000	71	1.000	112	1.000	153	1.000	194	1.000	235	1.000
31	1.000	72	1.000	113	1.000	154	1.000	195	1.000	236	1.000
32	1.000	73	1.000	114	1.000	155	1.000	196	1.000	237	1.000
33	1.000	74	1.000	115	1.000	156	1.000	197	1.000	238	1.000
34	1.000	75	1.000	116	1.000	157	1.000	198	1.000	239	1.000
35	1.000	76	1.000	117	1.000	158	1.000	199	1.000	240	1.000
36	1.000	77	1.000	118	1.000	159	1.000	200	1.000	241	1.000
37	1.000	78	1.000	119	1.000	160	1.000	201	1.000	242	1.000
38	1.000	79	1.000	120	1.000	161	1.000	202	1.000	243	1.000
39	1.000	80	1.000	121	1.000	162	1.000	203	1.000	244	1.000
40	1.000	81	1.000	122	1.000	163	1.000	204	1.000	245	1.000
41	1.000	82	1.000	123	1.000	164	1.000	205	1.000	246	1.000

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Surcharged Outfall Details for Surface Network 3

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	1.000	266	1.000	285	1.000	304	1.000	323	1.000	342	1.000
248	1.000	267	1.000	286	1.000	305	1.000	324	1.000	343	1.000
249	1.000	268	1.000	287	1.000	306	1.000	325	1.000	344	1.000
250	1.000	269	1.000	288	1.000	307	1.000	326	1.000	345	1.000
251	1.000	270	1.000	289	1.000	308	1.000	327	1.000	346	1.000
252	1.000	271	1.000	290	1.000	309	1.000	328	1.000	347	1.000
253	1.000	272	1.000	291	1.000	310	1.000	329	1.000	348	1.000
254	1.000	273	1.000	292	1.000	311	1.000	330	1.000	349	1.000
255	1.000	274	1.000	293	1.000	312	1.000	331	1.000	350	1.000
256	1.000	275	1.000	294	1.000	313	1.000	332	1.000	351	1.000
257	1.000	276	1.000	295	1.000	314	1.000	333	1.000	352	1.000
258	1.000	277	1.000	296	1.000	315	1.000	334	1.000	353	1.000
259	1.000	278	1.000	297	1.000	316	1.000	335	1.000	354	1.000
260	1.000	279	1.000	298	1.000	317	1.000	336	1.000	355	1.000
261	1.000	280	1.000	299	1.000	318	1.000	337	1.000	356	1.000
262	1.000	281	1.000	300	1.000	319	1.000	338	1.000	357	1.000
263	1.000	282	1.000	301	1.000	320	1.000	339	1.000	358	1.000
264	1.000	283	1.000	302	1.000	321	1.000	340	1.000	359	1.000
265	1.000	284	1.000	303	1.000	322	1.000	341	1.000	360	1.000

Simulation Criteria for Surface Network 3

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event +30% Climate Change

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Simulation Criteria for Surface Network 3

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 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, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 30

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	S301	15 Winter	100	+30%	100/15 Summer				114.517
1.001	S302	15 Winter	100	+30%	100/15 Summer				114.306
1.002	S303	15 Winter	100	+30%	100/15 Summer				114.023
2.000	S304	15 Winter	100	+30%					115.706
2.001	S305	15 Winter	100	+30%					115.109
2.002	S306	15 Winter	100	+30%					114.497
1.003	S307	15 Winter	100	+30%	100/15 Summer				113.773
1.004	S308	15 Winter	100	+30%	100/15 Summer				112.918
1.005	S309	15 Winter	100	+30%	100/15 Summer				112.322
1.006	S310	15 Winter	100	+30%	100/15 Summer				111.506
1.007	S311	15 Winter	100	+30%					110.242
3.000	S312	15 Winter	100	+30%					112.553
1.008	S313	15 Winter	100	+30%					109.870
1.009	S314	15 Winter	100	+30%					109.461
1.010	S315	180 Winter	100	+30%	100/30 Summer				106.936
4.000	S316	15 Winter	100	+30%	100/15 Summer				110.526
4.001	S317	15 Winter	100	+30%	100/15 Summer				109.687
4.002	S318	15 Winter	100	+30%	100/15 Summer				108.016
1.011	S319	180 Winter	100	+30%	100/15 Winter				106.741
5.000	S320	180 Winter	100	+30%	100/15 Winter				106.740

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow (l/s)	Overflow (l/s)					
1.000	S301	0.542	0.000	1.40				51.0	SURCHARGED	
1.001	S302	0.444	0.000	1.60				58.7	SURCHARGED	
1.002	S303	0.288	0.000	1.06				85.1	SURCHARGED	
2.000	S304	-0.141	0.000	0.30				24.7	OK	
2.001	S305	-0.101	0.000	0.58				48.4	OK	
2.002	S306	-0.083	0.000	0.71				62.4	OK	
1.003	S307	0.272	0.000	0.96				164.9	SURCHARGED	
1.004	S308	0.322	0.000	1.05				174.0	SURCHARGED	
1.005	S309	0.266	0.000	1.13				191.5	SURCHARGED	
1.006	S310	0.083	0.000	1.05				201.7	SURCHARGED	
1.007	S311	-0.209	0.000	0.56				213.3	OK	
3.000	S312	-0.109	0.000	0.52				38.3	OK	
1.008	S313	-0.118	0.000	0.88				291.4	OK	
1.009	S314	-0.183	0.000	0.65				341.8	OK	
1.010	S315	1.048	0.000	0.33				140.5	SURCHARGED	
4.000	S316	0.699	0.000	1.47				37.3	SURCHARGED	
4.001	S317	1.809	0.000	1.62				41.9	SURCHARGED	
4.002	S318	2.365	0.000	2.77				68.8	SURCHARGED	
1.011	S319	1.439	0.000	0.12				160.1	SURCHARGED	
5.000	S320	1.328	0.000	0.01				14.2	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

								Water	
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
5.001	S321	180	Winter	100	+30%	100/15	Winter		106.740
1.012	S322	180	Winter	100	+30%	100/15	Winter		106.740
1.013	S323	180	Winter	100	+30%	100/15	Summer		106.739
1.014	S324	180	Winter	100	+30%	100/15	Summer		106.738

		Surcharged		Flooded	Half Drain		Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	S321	1.413	0.000	0.01			23.0	SURCHARGED	
1.012	S322	1.462	0.000	0.07			187.8	SURCHARGED	
1.013	S323	1.617	0.000	0.10			193.2	SURCHARGED	
1.014	S324	2.935	0.000	1.20			41.8	FLOOD RISK	

Storm Water Network 4

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 4

Pipe Sizes STANDARD Manhole Sizes STANDARD








FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.800	Add Flow / Climate Change (%)	0
Ratio R	0.281	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits


Network Design Table for Surface Network 4

« - Indicates pipe capacity < flow






PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.000	44.626	0.915	48.8	0.052	5.00	0.0	0.600	o	225	Pipe/Conduit		
1.001	62.713	1.492	42.0	0.081	0.00	0.0	0.600	o	225	Pipe/Conduit		
2.000	55.083	0.334	164.9	0.152	5.00	0.0	0.600	o	225	Pipe/Conduit		
1.002	78.483	2.116	37.1	0.102	0.00	0.0	0.600	o	375	Pipe/Conduit		
3.000	21.967	0.295	74.5	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		
3.001	23.540	0.316	74.5	0.164	0.00	0.0	0.600	o	225	Pipe/Conduit		
1.003	46.945	2.235	21.0	0.110	0.00	0.0	0.600	o	375	Pipe/Conduit		

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.40	116.777	0.052	0.0	0.0	0.0	1.88	74.7	7.0
1.001	50.00	5.91	115.862	0.133	0.0	0.0	0.0	2.02	80.5	18.0
2.000	50.00	5.90	114.704	0.152	0.0	0.0	0.0	1.02	40.4	20.6
1.002	50.00	6.35	114.220	0.387	0.0	0.0	0.0	2.98	329.5	52.4
3.000	50.00	5.24	112.865	0.015	0.0	0.0	0.0	1.52	60.3	2.0
3.001	50.00	5.50	112.570	0.179	0.0	0.0	0.0	1.52	60.3	24.2
1.003	49.52	6.55	112.104	0.676	0.0	0.0	0.0	3.97	438.3	90.7

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Network Design Table for Surface Network 4

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.004	20.767	0.052	399.4	0.046	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	31.022	0.078	397.7	0.054	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.006	25.220	0.063	400.3	0.054	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.007	14.107	0.035	403.1	0.077	0.00	0.0	0.600	o	1500	Pipe/Conduit	
1.008	6.573	0.047	139.9	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)
1.004	48.47	6.89	109.794	0.722	0.0	0.0	0.0	1.01	160.8	94.8
1.005	47.77	7.13	108.692	0.776	0.0	0.0	0.0	2.14	3790.0	100.4
1.006	47.22	7.33	108.614	0.830	0.0	0.0	0.0	2.14	3777.6	106.1
1.007	46.91	7.44	108.551	0.907	0.0	0.0	0.0	2.13	3764.7	115.2
1.008	46.64	7.54	108.516	0.907	0.0	0.0	0.0	1.10	43.9<	115.2

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Online Controls for Surface Network 4

Depth/Flow Relationship Manhole: S414, DS/PN: 1.008, Volume (m³): 38.0

Invert Level (m) 108.516

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.3600	0.800	20.7500	2.000	23.3300	3.200	29.5100
0.200	13.6600	1.000	19.4100	2.200	24.4700	3.400	30.4200
0.300	18.9100	1.200	18.8000	2.400	25.5600	3.600	31.3000
0.400	21.8000	1.400	19.5200	2.600	26.6000	3.800	32.1600
0.500	22.7900	1.600	20.8700	2.800	27.6000		
0.600	22.5500	1.800	22.1300	3.000	28.5700		

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Storage Structures for Surface Network 4

Tank or Pond Manhole: S414, DS/PN: 1.008








Invert Level (m) 110.850

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	586.3	0.500	777.8

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Manhole Schedules for Surface Network 4

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out		Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	
S401	118.355	1.578	Open Manhole	1350	1.000	116.777	225			
S402	118.935	3.073	Open Manhole	1500	1.001	115.862	225	1.000	115.862	225
S404	116.328	1.624	Open Manhole	1350	2.000	114.704	225			
S405	116.856	2.636	Open Manhole	1800	1.002	114.220	375	1.001	114.370	225
								2.000	114.370	225
S407	114.456	1.591	Open Manhole	1350	3.000	112.865	225			
S408	114.523	1.953	Open Manhole	1350	3.001	112.570	225	3.000	112.570	225
S409	114.256	2.152	Open Manhole	1800	1.003	112.104	375	1.002	112.104	375
								3.001	112.254	225
S410	112.505	2.711	Open Manhole	1500	1.004	109.794	450	1.003	109.869	375
S411	111.719	3.027	Open Manhole	3000	1.005	108.692	1500	1.004	109.742	450
S412	111.859	3.245	Open Manhole	3000	1.006	108.614	1500	1.005	108.614	1500
S413	111.580	3.029	Open Manhole	3000	1.007	108.551	1500	1.006	108.551	1500
S414	111.120	2.604	Open Manhole	3000	1.008	108.516	225	1.007	108.516	1500
S415	108.700	0.231	Open Manhole	0		OUTFALL		1.008	108.469	225

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S401	360582.948	437865.029	360582.948	437865.029	Required	
S402	360618.846	437891.540	360618.846	437891.540	Required	
S404	360537.418	437909.396	360537.418	437909.396	Required	
S405	360581.742	437942.099	360581.742	437942.099	Required	
S407	360497.984	437978.850	360497.984	437978.850	Required	
S408	360516.085	437991.296	360516.085	437991.296	Required	
S409	360535.078	438005.203	360535.078	438005.203	Required	

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Manhole Schedules for Surface Network 4

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S410	360507.343	438043.080	360507.343	438043.080	Required	
S411	360495.124	438059.871	360495.124	438059.871	Required	
S412	360468.964	438043.196	360468.964	438043.196	Required	
S413	360447.697	438029.641	360447.697	438029.641	Required	
S414	360435.030	438035.851	360435.030	438035.851	Required	
S415	360428.660	438037.473			No Entry	

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event

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Simulation Criteria for Surface Network 4

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 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, 2160, 2880, 4320, 5760,
7200, 8640, 10080
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 Level (m)
1.000	S401	15 Winter	30	+0%					116.847
1.001	S402	15 Winter	30	+0%					115.975
2.000	S404	15 Winter	30	+0%	30/15 Summer				114.967
1.002	S405	15 Winter	30	+0%					114.372
3.000	S407	15 Winter	30	+0%					112.907
3.001	S408	15 Winter	30	+0%					112.747
1.003	S409	15 Winter	30	+0%					112.288
1.004	S410	15 Winter	30	+0%	30/15 Summer				110.305
1.005	S411	120 Winter	30	+0%	30/120 Winter				110.252
1.006	S412	120 Winter	30	+0%	30/60 Winter				110.252
1.007	S413	120 Winter	30	+0%	30/60 Winter				110.252
1.008	S414	120 Winter	30	+0%	30/15 Summer				110.252

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S401	-0.155	0.000	0.20		14.5	OK	
1.001	S402	-0.112	0.000	0.49		38.3	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Surcharged		Flooded		Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow	Overflow					
2.000	S404	0.038	0.000	1.07				41.5	SURCHARGED	
1.002	S405	-0.223	0.000	0.34				106.2	OK	
3.000	S407	-0.183	0.000	0.08				4.2	OK	
3.001	S408	-0.048	0.000	0.97				53.9	OK	
1.003	S409	-0.191	0.000	0.47				188.0	OK	
1.004	S410	0.061	0.000	1.56				204.4	SURCHARGED	
1.005	S411	0.060	0.000	0.03				78.3	SURCHARGED	
1.006	S412	0.138	0.000	0.02				52.2	SURCHARGED	
1.007	S413	0.201	0.000	0.02				34.9	SURCHARGED	
1.008	S414	1.511	0.000	0.74				22.7	SURCHARGED	

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event with Surcharged Outfall

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Surcharged Outfall Details for Surface Network 4

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

1.008	S415	108.700	108.469	0.000	0 0
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Datum (m) 108.370 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)
1	1.000	42	1.000	83	1.000	124	1.000	165	1.000	206	1.000
2	1.000	43	1.000	84	1.000	125	1.000	166	1.000	207	1.000
3	1.000	44	1.000	85	1.000	126	1.000	167	1.000	208	1.000
4	1.000	45	1.000	86	1.000	127	1.000	168	1.000	209	1.000
5	1.000	46	1.000	87	1.000	128	1.000	169	1.000	210	1.000
6	1.000	47	1.000	88	1.000	129	1.000	170	1.000	211	1.000
7	1.000	48	1.000	89	1.000	130	1.000	171	1.000	212	1.000
8	1.000	49	1.000	90	1.000	131	1.000	172	1.000	213	1.000
9	1.000	50	1.000	91	1.000	132	1.000	173	1.000	214	1.000
10	1.000	51	1.000	92	1.000	133	1.000	174	1.000	215	1.000
11	1.000	52	1.000	93	1.000	134	1.000	175	1.000	216	1.000
12	1.000	53	1.000	94	1.000	135	1.000	176	1.000	217	1.000
13	1.000	54	1.000	95	1.000	136	1.000	177	1.000	218	1.000
14	1.000	55	1.000	96	1.000	137	1.000	178	1.000	219	1.000
15	1.000	56	1.000	97	1.000	138	1.000	179	1.000	220	1.000
16	1.000	57	1.000	98	1.000	139	1.000	180	1.000	221	1.000
17	1.000	58	1.000	99	1.000	140	1.000	181	1.000	222	1.000
18	1.000	59	1.000	100	1.000	141	1.000	182	1.000	223	1.000
19	1.000	60	1.000	101	1.000	142	1.000	183	1.000	224	1.000
20	1.000	61	1.000	102	1.000	143	1.000	184	1.000	225	1.000
21	1.000	62	1.000	103	1.000	144	1.000	185	1.000	226	1.000
22	1.000	63	1.000	104	1.000	145	1.000	186	1.000	227	1.000
23	1.000	64	1.000	105	1.000	146	1.000	187	1.000	228	1.000
24	1.000	65	1.000	106	1.000	147	1.000	188	1.000	229	1.000
25	1.000	66	1.000	107	1.000	148	1.000	189	1.000	230	1.000
26	1.000	67	1.000	108	1.000	149	1.000	190	1.000	231	1.000
27	1.000	68	1.000	109	1.000	150	1.000	191	1.000	232	1.000
28	1.000	69	1.000	110	1.000	151	1.000	192	1.000	233	1.000
29	1.000	70	1.000	111	1.000	152	1.000	193	1.000	234	1.000
30	1.000	71	1.000	112	1.000	153	1.000	194	1.000	235	1.000
31	1.000	72	1.000	113	1.000	154	1.000	195	1.000	236	1.000
32	1.000	73	1.000	114	1.000	155	1.000	196	1.000	237	1.000
33	1.000	74	1.000	115	1.000	156	1.000	197	1.000	238	1.000
34	1.000	75	1.000	116	1.000	157	1.000	198	1.000	239	1.000
35	1.000	76	1.000	117	1.000	158	1.000	199	1.000	240	1.000
36	1.000	77	1.000	118	1.000	159	1.000	200	1.000	241	1.000
37	1.000	78	1.000	119	1.000	160	1.000	201	1.000	242	1.000
38	1.000	79	1.000	120	1.000	161	1.000	202	1.000	243	1.000
39	1.000	80	1.000	121	1.000	162	1.000	203	1.000	244	1.000
40	1.000	81	1.000	122	1.000	163	1.000	204	1.000	245	1.000
41	1.000	82	1.000	123	1.000	164	1.000	205	1.000	246	1.000

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Surcharged Outfall Details for Surface Network 4


Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	1.000	266	1.000	285	1.000	304	1.000	323	1.000	342	1.000
248	1.000	267	1.000	286	1.000	305	1.000	324	1.000	343	1.000
249	1.000	268	1.000	287	1.000	306	1.000	325	1.000	344	1.000
250	1.000	269	1.000	288	1.000	307	1.000	326	1.000	345	1.000
251	1.000	270	1.000	289	1.000	308	1.000	327	1.000	346	1.000
252	1.000	271	1.000	290	1.000	309	1.000	328	1.000	347	1.000
253	1.000	272	1.000	291	1.000	310	1.000	329	1.000	348	1.000
254	1.000	273	1.000	292	1.000	311	1.000	330	1.000	349	1.000
255	1.000	274	1.000	293	1.000	312	1.000	331	1.000	350	1.000
256	1.000	275	1.000	294	1.000	313	1.000	332	1.000	351	1.000
257	1.000	276	1.000	295	1.000	314	1.000	333	1.000	352	1.000
258	1.000	277	1.000	296	1.000	315	1.000	334	1.000	353	1.000
259	1.000	278	1.000	297	1.000	316	1.000	335	1.000	354	1.000
260	1.000	279	1.000	298	1.000	317	1.000	336	1.000	355	1.000
261	1.000	280	1.000	299	1.000	318	1.000	337	1.000	356	1.000
262	1.000	281	1.000	300	1.000	319	1.000	338	1.000	357	1.000
263	1.000	282	1.000	301	1.000	320	1.000	339	1.000	358	1.000
264	1.000	283	1.000	302	1.000	321	1.000	340	1.000	359	1.000
265	1.000	284	1.000	303	1.000	322	1.000	341	1.000	360	1.000

Simulation Criteria for Surface Network 4

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 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, 2160, 2880, 4320, 5760,
7200, 8640, 10080
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 Level (m)
1.000	S401	15 Winter	30	+0%					116.847
1.001	S402	15 Winter	30	+0%					115.975
2.000	S404	15 Winter	30	+0%	30/15 Summer				114.967
1.002	S405	15 Winter	30	+0%					114.372
3.000	S407	15 Winter	30	+0%					112.907
3.001	S408	15 Winter	30	+0%					112.747
1.003	S409	15 Winter	30	+0%					112.288
1.004	S410	180 Winter	30	+0%	30/15 Summer				110.902
1.005	S411	180 Winter	30	+0%	30/60 Winter				110.895
1.006	S412	180 Winter	30	+0%	30/60 Summer				110.895
1.007	S413	180 Winter	30	+0%	30/60 Summer				110.895
1.008	S414	180 Winter	30	+0%	30/15 Summer				110.894

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S401	-0.155	0.000	0.20		14.5	OK	
1.001	S402	-0.112	0.000	0.49		38.3	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Surcharged		Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow	Overflow						
2.000	S404	0.038	0.000	1.07					41.5	SURCHARGED	
1.002	S405	-0.223	0.000	0.34					106.2	OK	
3.000	S407	-0.183	0.000	0.08					4.2	OK	
3.001	S408	-0.048	0.000	0.97					53.9	OK	
1.003	S409	-0.191	0.000	0.47					188.0	OK	
1.004	S410	0.658	0.000	0.45					58.6	SURCHARGED	
1.005	S411	0.703	0.000	0.03					60.6	SURCHARGED	
1.006	S412	0.781	0.000	0.02					48.7	SURCHARGED	
1.007	S413	0.844	0.000	0.03					50.8	SURCHARGED	
1.008	S414	2.153	0.000	0.74					22.7	FLOOD RISK	

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event +30% Climate Change


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Simulation Criteria for Surface Network 4

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000	
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000	
Hot Start (mins)	0	Inlet Coefficient	0.800	
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000	
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60	
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1	
Number of Input Hydrographs		0	Number of Storage Structures	1
Number of Online Controls		1	Number of Time/Area Diagrams	0
Number of Offline Controls		0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.281		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 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, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 30

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	S401	15 Winter	100	+30%					116.869
1.001	S402	15 Winter	100	+30%					116.022
2.000	S404	15 Winter	100	+30%	100/15 Summer				115.571
1.002	S405	15 Winter	100	+30%					114.421
3.000	S407	15 Winter	100	+30%	100/15 Summer				113.211
3.001	S408	15 Winter	100	+30%	100/15 Summer				113.199
1.003	S409	15 Winter	100	+30%					112.351
1.004	S410	120 Winter	100	+30%	100/15 Summer				111.082
1.005	S411	120 Winter	100	+30%	100/15 Summer				111.073
1.006	S412	120 Winter	100	+30%	100/15 Summer				111.072
1.007	S413	120 Winter	100	+30%	100/15 Summer				111.071
1.008	S414	120 Winter	100	+30%	100/15 Summer				111.071

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S401	-0.133	0.000	0.34		24.3	OK	
1.001	S402	-0.065	0.000	0.82		63.6	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

PN	US/MH Name	Surcharged		Flooded		Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow (l/s)	Overflow (l/s)					
2.000	S404	0.642	0.000	1.66				64.5	SURCHARGED	
1.002	S405	-0.174	0.000	0.54				170.2	OK	
3.000	S407	0.121	0.000	0.19				10.5	SURCHARGED	
3.001	S408	0.404	0.000	1.49				82.7	SURCHARGED	
1.003	S409	-0.128	0.000	0.75				302.6	OK	
1.004	S410	0.838	0.000	0.96				125.3	SURCHARGED	
1.005	S411	0.881	0.000	0.06				134.1	SURCHARGED	
1.006	S412	0.958	0.000	0.06				142.5	SURCHARGED	
1.007	S413	1.020	0.000	0.10				154.1	SURCHARGED	
1.008	S414	2.330	0.000	0.86				26.4	FLOOD RISK	
















Phase 1 - Foul Water Network 1

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FOUL SEWERAGE DESIGN


Network Design Table for FW1 - PDS Export.FWS

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	21.577	0.755	28.6	0.000	6	0.0	1.500	o	150	
1.001	10.136	0.507	20.0	0.000	0	0.0	1.500	o	150	
1.002	9.531	0.071	135.0	0.000	6	0.0	1.500	o	150	
1.003	36.247	0.324	111.9	0.000	0	0.0	1.500	o	150	
1.004	36.094	0.690	52.3	0.000	0	0.0	1.500	o	150	
1.005	9.292	0.069	135.0	0.000	3	0.0	1.500	o	150	
1.006	7.293	0.054	135.0	0.000	0	0.0	1.500	o	150	
1.007	29.244	0.491	59.6	0.000	0	0.0	1.500	o	150	
1.008	9.888	0.482	20.5	0.000	8	0.0	1.500	o	150	
2.000	46.275	1.361	34.0	0.000	200	0.0	1.500	o	150	
2.001	35.226	1.761	20.0	0.000	5	0.0	1.500	o	150	
2.002	10.901	0.081	134.6	0.000	5	0.0	1.500	o	150	
2.003	23.107	0.098	235.8	0.000	195	0.0	1.500	o	225	
2.004	25.222	1.264	20.0	0.000	0	0.0	1.500	o	225	
1.009	27.745	0.118	235.1	0.000	0	0.0	1.500	o	225	














Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	107.117	0.000	0.0	6	0.0	11	0.50	1.64	29.0	0.3
1.001	106.362	0.000	0.0	6	0.0	10	0.57	1.97	34.7	0.3
1.002	105.855	0.000	0.0	12	0.0	21	0.37	0.75	13.3	0.6
1.003	105.784	0.000	0.0	12	0.0	20	0.39	0.83	14.6	0.6
1.004	105.460	0.000	0.0	12	0.0	17	0.51	1.21	21.4	0.6
1.005	104.770	0.000	0.0	15	0.0	24	0.39	0.75	13.3	0.7
1.006	104.702	0.000	0.0	15	0.0	24	0.39	0.75	13.3	0.7
1.007	104.648	0.000	0.0	15	0.0	19	0.52	1.14	20.1	0.7
1.008	104.157	0.000	0.0	23	0.0	18	0.86	1.94	34.3	1.1
2.000	108.240	0.000	0.0	200	0.0	62	1.37	1.51	26.6	9.4
2.001	106.879	0.000	0.0	205	0.0	54	1.68	1.96	34.7	9.6
2.002	105.118	0.000	0.0	210	0.0	96	0.83	0.75	13.3	9.8
2.003	104.962	0.000	0.0	405	0.0	131	0.79	0.75	29.7	19.0
2.004	104.864	0.000	0.0	405	0.0	66	1.97	2.58	102.4	19.0
1.009	103.600	0.000	0.0	428	0.0	136	0.80	0.75	29.7	20.1

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FOUL SEWERAGE DESIGN

Network Design Table for FW1 - PDS Export.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.010	21.277	0.091	235.0	0.000	3	0.0	1.500	o	225	
1.011	9.211	0.039	235.0	0.000	7	0.0	1.500	o	225	
1.012	16.634	0.071	235.0	0.000	0	0.0	1.500	o	225	
1.013	34.291	1.593	21.5	0.000	2	0.0	1.500	o	225	
3.000	28.025	0.208	135.0	0.000	2	0.0	1.500	o	150	
3.001	23.238	0.332	70.0	0.000	0	0.0	1.500	o	150	
3.002	12.851	0.643	20.0	0.000	4	0.0	1.500	o	150	
3.003	28.939	1.453	19.9	0.000	7	0.0	1.500	o	150	
4.000	35.578	0.404	88.1	0.000	7	0.0	1.500	o	150	
4.001	13.249	0.103	128.9	0.000	4	0.0	1.500	o	150	
3.004	13.280	0.099	134.0	0.000	4	0.0	1.500	o	150	
5.000	32.509	1.086	29.9	0.000	4	0.0	1.500	o	150	
5.001	13.165	0.663	19.9	0.000	0	0.0	1.500	o	150	














Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add	Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.010	103.482	0.000	0.0	431	0.0	136	0.80	0.75	29.7	20.2
1.011	103.391	0.000	0.0	438	0.0	138	0.81	0.75	29.7	20.5
1.012	103.352	0.000	0.0	438	0.0	138	0.81	0.75	29.7	20.5
1.013	103.281	0.000	0.0	440	0.0	70	1.96	2.48	98.6	20.6
3.000	104.652	0.000	0.0	2	0.0	9	0.21	0.75	13.3	0.1
3.001	104.444	0.000	0.0	2	0.0	8	0.26	1.05	18.5	0.1
3.002	104.112	0.000	0.0	6	0.0	10	0.57	1.96	34.7	0.3
3.003	103.470	0.000	0.0	13	0.0	14	0.73	1.97	34.8	0.6
4.000	102.524	0.000	0.0	7	0.0	15	0.36	0.93	16.5	0.3
4.001	102.120	0.000	0.0	11	0.0	20	0.36	0.77	13.6	0.5
3.004	102.017	0.000	0.0	28	0.0	32	0.48	0.76	13.4	1.3
5.000	103.667	0.000	0.0	4	0.0	9	0.43	1.61	28.4	0.2
5.001	102.581	0.000	0.0	4	0.0	8	0.49	1.97	34.8	0.2

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FOUL SEWERAGE DESIGN

Network Design Table for FW1 - PDS Export.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
3.005	20.894	0.155	134.8	0.000	0	0.0	1.500	o	150	
1.014	17.155	0.073	235.0	0.000	0	0.0	1.500	o	225	
1.015	13.743	0.058	235.0	0.000	2	0.0	1.500	o	225	
1.016	21.770	0.093	235.0	0.000	0	0.0	1.500	o	225	
1.017	11.274	0.162	69.6	0.000	8	0.0	1.500	o	225	
6.000	34.974	0.259	135.0	0.000	5	0.0	1.500	o	150	
7.000	13.792	0.521	26.5	0.000	8	0.0	1.500	o	150	
6.001	51.228	0.379	135.0	0.000	0	0.0	1.500	o	150	
6.002	27.732	0.590	47.0	0.000	13	0.0	1.500	o	150	
6.003	10.422	0.077	135.0	0.000	5	0.0	1.500	o	150	
6.004	56.806	0.421	135.0	0.000	0	0.0	1.500	o	750	
1.018	3.254	0.024	135.0	0.000	0	0.0	1.500	o	150	
1.019	185.986	-4.482	-41.5	0.000	0	0.0	1.500	o	300	


Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add	Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.005	101.918	0.000	0.0	32	0.0	34	0.50	0.75	13.3	1.5
1.014	101.688	0.000	0.0	472	0.0	145	0.82	0.75	29.7	22.1
1.015	101.615	0.000	0.0	474	0.0	145	0.82	0.75	29.7	22.2
1.016	101.557	0.000	0.0	474	0.0	145	0.82	0.75	29.7	22.2
1.017	101.464	0.000	0.0	482	0.0	101	1.31	1.38	54.8	22.6
6.000	103.029	0.000	0.0	5	0.0	14	0.28	0.75	13.3	0.2
7.000	103.291	0.000	0.0	8	0.0	12	0.56	1.71	30.2	0.4
6.001	102.770	0.000	0.0	13	0.0	22	0.38	0.75	13.3	0.6
6.002	102.390	0.000	0.0	26	0.0	24	0.67	1.28	22.6	1.2
6.003	101.800	0.000	0.0	31	0.0	34	0.49	0.75	13.3	1.5
6.004	101.723	0.000	0.0	31	0.0	22	0.39	2.15	950.7	1.5
1.018	101.302	0.000	0.0	513	0.0	150	0.75	0.75	13.3	24.0
1.019	101.278	0.000	0.0	513	0.0	300	0.14	0.14	9.6	24.0

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FOUL SEWERAGE DESIGN

Network Design Table for FW1 - PDS Export.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.020	7.073	0.021	340.0	0.000	0	0.0	1.500	o	300	

Network Results Table


PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
1.020	105.760	0.000	0.0	513	0.0	142	0.73	0.75	53.0	24.0

Barratt Homes Manchester		Page 4
4 Brindley Road City Park Manchester M16 9HQ		Chipping Lane Longridge
Date 10.10.16 File FW Network 1, Rev D.mdx		Designed by CD Checked by SG
Micro Drainage		Network 2014.1.1




Manhole Schedules for FW1 - PDS Export.FWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	108.762	1.645	Open Manhole	1350	1.000	107.117	150				
2	108.164	1.802	Open Manhole	1200	1.001	106.362	150	1.000	106.362	150	
3	107.960	2.105	Open Manhole	1350	1.002	105.855	150	1.001	105.855	150	
4	107.858	2.074	Open Manhole	1200	1.003	105.784	150	1.002	105.784	150	
5	107.505	2.045	Open Manhole	1200	1.004	105.460	150	1.003	105.460	150	
6	107.578	2.808	Open Manhole	1200	1.005	104.770	150	1.004	104.770	150	
7	107.447	2.745	Open Manhole	1200	1.006	104.702	150	1.005	104.702	150	
8	107.337	2.689	Open Manhole	1200	1.007	104.648	150	1.006	104.648	150	
9	106.880	2.723	Open Manhole	1200	1.008	104.157	150	1.007	104.157	150	
20	109.898	1.658	Open Manhole	1200	2.000	108.240	150				
21	108.550	1.671	Open Manhole	1200	2.001	106.879	150	2.000	106.879	150	
22	107.328	2.210	Open Manhole	1350	2.002	105.118	150	2.001	105.118	150	
23	106.952	1.990	Open Manhole	1200	2.003	104.962	225	2.002	105.037	150	
24	106.615	1.751	Open Manhole	1200	2.004	104.864	225	2.003	104.864	225	
10	106.852	3.252	Open Manhole	1200	1.009	103.600	225	1.008	103.675	150	
								2.004	103.600	225	
11	106.898	3.416	Open Manhole	1200	1.010	103.482	225	1.009	103.482	225	
12	106.549	3.158	Open Manhole	1200	1.011	103.391	225	1.010	103.391	225	
13	106.397	3.045	Open Manhole	1200	1.012	103.352	225	1.011	103.352	225	
14	106.160	2.879	Open Manhole	1350	1.013	103.281	225	1.012	103.281	225	
25	106.302	1.650	Open Manhole	1200	3.000	104.652	150				
26	106.321	1.877	Open Manhole	1200	3.001	104.444	150	3.000	104.444	150	
27	105.875	1.763	Open Manhole	1200	3.002	104.112	150	3.001	104.112	150	
28	105.655	2.185	Open Manhole	1200	3.003	103.470	150	3.002	103.470	150	
31	105.283	2.759	Open Manhole	1200	4.000	102.524	150				
32	105.918	3.798	Open Manhole	1200	4.001	102.120	150	4.000	102.120	150	
29	105.942	3.925	Open Manhole	1200	3.004	102.017	150	3.003	102.017	150	
								4.001	102.017	150	
33	105.617	1.950	Open Manhole	1200	5.000	103.667	150				
34	105.795	3.214	Open Manhole	1200	5.001	102.581	150	5.000	102.581	150	
30	105.781	3.863	Open Manhole	1200	3.005	101.918	150	3.004	101.918	150	
								5.001	101.918	150	
15	105.682	3.994	Open Manhole	1350	1.014	101.688	225	1.013	101.688	225	
								3.005	101.763	150	

Barratt Homes Manchester		Page 5
4 Brindley Road City Park Manchester M16 9HQ	Chipping Lane Longridge	
Date 10.10.16 File FW Network 1, Rev D.mdx	Designed by CD Checked by SG	
Micro Drainage	Network 2014.1.1	

Manhole Schedules for FW1 - PDS Export.FWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
16	105.764	4.149	Open Manhole	1350	1.015	101.615	225	1.014	101.615	225	
17	105.885	4.328	Open Manhole	1200	1.016	101.557	225	1.015	101.557	225	
18	105.724	4.260	Open Manhole	1500	1.017	101.464	225	1.016	101.464	225	
36	105.595	2.566	Open Manhole	1200	6.000	103.029	150				
41	105.841	2.550	Open Manhole	1200	7.000	103.291	150				
37	106.021	3.251	Open Manhole	1200	6.001	102.770	150	6.000	102.770	150	
								7.000	102.770	150	
38	105.301	2.911	Open Manhole	1350	6.002	102.390	150	6.001	102.390	150	
39	104.996	3.196	Open Manhole	1200	6.003	101.800	150	6.002	101.800	150	
43	105.000	3.277	Open Manhole	2100	6.004	101.723	750	6.003	101.723	150	
19	105.800	4.498	Open Manhole	2400	1.018	101.302	150	1.017	101.302	225	
								6.004	101.302	750	
42	105.800	4.522	Open Manhole	1200	1.019	101.278	300	1.018	101.278	150	
44	108.350	2.590	Open Manhole	1200	1.020	105.760	300	1.019	105.760	300	
UU1802	108.570	2.831	Open Manhole	0		OUTFALL		1.020	105.739	300	

Barratt Homes Manchester		Page 0
4 Brindley Road City Park Manchester M16 9HQ		
Date 15/10/2019 16:28	Designed by doyleco	
File Chipping Lane 06.09.19.MDX	Checked by	
Micro Drainage	Network 2018.1.1	

FOUL SEWERAGE DESIGN











Design Criteria for Foul Network 3

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500


Designed with Level Soffits

Network Design Table for Foul Network 3











PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	60.334	0.603	100.1	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
2.000	56.779	2.969	19.1	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
1.001	75.976	2.250	33.8	0.000	11	0.0	1.500	o	150	Pipe/Conduit	
3.000	28.239	0.466	60.6	0.000	11	0.0	1.500	o	150	Pipe/Conduit	
1.002	46.479	1.343	34.6	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
1.003	24.445	0.707	34.6	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
1.004	31.403	0.908	34.6	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.005	32.574	0.937	34.8	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
1.006	17.710	0.131	135.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
1.007	26.316	0.195	135.0	0.000	6	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	E Area (ha)	E Base Flow (l/s)	E Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	114.507	0.000	0.0	6	0.0	14	0.32	0.88	15.5	0.3
2.000	116.873	0.000	0.0	5	0.0	9	0.54	2.01	35.5	0.2
1.001	113.904	0.000	0.0	22	0.0	20	0.71	1.51	26.7	1.0
3.000	112.120	0.000	0.0	11	0.0	17	0.47	1.13	19.9	0.5
1.002	111.654	0.000	0.0	38	0.0	26	0.84	1.49	26.4	1.8
1.003	110.311	0.000	0.0	43	0.0	28	0.87	1.49	26.4	2.0
1.004	109.604	0.000	0.0	43	0.0	28	0.87	1.49	26.4	2.0
1.005	108.696	0.000	0.0	50	0.0	30	0.91	1.49	26.3	2.3
1.006	107.759	0.000	0.0	52	0.0	43	0.57	0.75	13.3	2.4
1.007	107.628	0.000	0.0	58	0.0	46	0.59	0.75	13.3	2.7


Barratt Homes Manchester		Page 1
4 Brindley Road City Park Manchester M16 9HQ		
Date 15/10/2019 16:28 File Chipping Lane 06.09.19.MDX	Designed by doyleco Checked by	
Micro Drainage		Network 2018.1.1

Network Design Table for Foul Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.008	28.432	0.211	135.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
1.009	14.716	0.154	95.7	0.000	8	0.0	1.500	o	150	Pipe/Conduit		
4.000	22.656	2.248	10.1	0.000	11	0.0	1.500	o	150	Pipe/Conduit		
1.010	9.126	0.091	100.3	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
5.000	29.446	0.260	113.3	0.000	8	0.0	1.500	o	150	Pipe/Conduit		
5.001	23.998	0.212	113.2	0.000	8	0.0	1.500	o	150	Pipe/Conduit		
1.011	57.766	1.457	39.6	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
1.012	25.668	0.190	135.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
1.013	25.667	0.145	177.0	0.000	3	0.0	1.500	o	225	Pipe/Conduit		
1.014	26.249	0.141	186.2	0.000	3	0.0	1.500	o	225	Pipe/Conduit		

Network Results Table


PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.008	107.433	0.000	0.0	58	0.0	46	0.59	0.75	13.3	2.7
1.009	107.223	0.000	0.0	66	0.0	45	0.69	0.90	15.8	3.1
4.000	109.317	0.000	0.0	11	0.0	11	0.87	2.77	49.0	0.5
1.010	107.069	0.000	0.0	77	0.0	49	0.71	0.87	15.5	3.6
5.000	107.450	0.000	0.0	8	0.0	17	0.34	0.82	14.5	0.4
5.001	107.190	0.000	0.0	16	0.0	23	0.42	0.82	14.5	0.7
1.011	106.978	0.000	0.0	93	0.0	42	1.04	1.39	24.6	4.3
1.012	105.521	0.000	0.0	93	0.0	59	0.67	0.75	13.3	4.3
1.013	105.256	0.000	0.0	96	0.0	55	0.59	0.86	34.3	4.4
1.014	105.111	0.000	0.0	99	0.0	56	0.59	0.84	33.4	4.6

Barratt Homes Manchester		Page 0
4 Brindley Road City Park Manchester M16 9HQ		
Date 15/10/2019 16:29 File Chipping Lane 06.09.19.MDX	Designed by doyleco Checked by	
Micro Drainage		Network 2018.1.1

Manhole Schedules for Foul Network 3

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out			Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	Diameter (mm)	
F301	116.135	1.628	Open Manhole	1350	1.000	114.507	150				
F302	118.523	1.650	Open Manhole	1200	2.000	116.873	150				
F303	116.560	2.656	Open Manhole	1800	1.001	113.904	150	1.000	113.904	150	
								2.000	113.904	150	
F305	114.158	2.038	Open Manhole	1200	3.000	112.120	150				
F306	113.928	2.274	Open Manhole	1350	1.002	111.654	150	1.001	111.654	150	
								3.000	111.654	150	
F307	112.317	2.006	Open Manhole	1200	1.003	110.311	150	1.002	110.311	150	
F308	111.461	1.857	Open Manhole	1350	1.004	109.604	150	1.003	109.604	150	
F309	111.705	3.009	Open Manhole	1200	1.005	108.696	150	1.004	108.696	150	
F310	111.341	3.582	Open Manhole	1200	1.006	107.759	150	1.005	107.759	150	
F311	111.072	3.444	Open Manhole	1350	1.007	107.628	150	1.006	107.628	150	
F312	110.592	3.159	Open Manhole	1200	1.008	107.433	150	1.007	107.433	150	
F313	110.160	2.937	Open Manhole	1200	1.009	107.223	150	1.008	107.223	150	
F314	110.967	1.650	Open Manhole	1200	4.000	109.317	150				
F315	109.998	2.929	Open Manhole	1200	1.010	107.069	150	1.009	107.069	150	
								4.000	107.069	150	
F316	109.019	1.569	Open Manhole	1350	5.000	107.450	150				
F317	109.714	2.524	Open Manhole	1350	5.001	107.190	150	5.000	107.190	150	
F318	109.577	2.599	Open Manhole	1350	1.011	106.978	150	1.010	106.978	150	
								5.001	106.978	150	
F319	107.205	1.684	Open Manhole	1200	1.012	105.521	150	1.011	105.521	150	
F320	107.189	1.933	Open Manhole	1350	1.013	105.256	225	1.012	105.331	150	
F321	106.834	1.723	Open Manhole	1200	1.014	105.111	225	1.013	105.111	225	
F23	106.952	1.982	Open Manhole	1200		OUTFALL		1.014	104.970	225	

Phase 2 - Foul Water Network 1

Barratt Homes Manchester		Page 0
4 Brindley Road City Park, Manchester Cheshire M169HQ		
Date 28/09/2021 10:26	Designed by doyleco	
File CHIPPING LANE 21.09.21.MDX	Checked by	
Innovyze	Network 2020.1.3	

FOUL SEWERAGE DESIGN








Design Criteria for Foul Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits


Network Design Table for Foul Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	22.412	0.252	88.9	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
1.001	30.458	0.459	66.4	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.002	6.126	0.086	71.2	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
1.003	27.937	1.473	19.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.004	22.606	0.167	135.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.005	26.382	1.437	18.4	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.006	7.840	0.093	84.3	0.000	12	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	109.907	0.000	0.0	4	0.0	12	0.30	0.93	16.4	0.2
1.001	109.655	0.000	0.0	4	0.0	11	0.33	1.08	19.0	0.2
1.002	109.196	0.000	0.0	8	0.0	15	0.40	1.04	18.4	0.4
1.003	109.110	0.000	0.0	8	0.0	11	0.63	2.02	35.7	0.4
1.004	107.637	0.000	0.0	8	0.0	17	0.32	0.75	13.3	0.4
1.005	107.470	0.000	0.0	8	0.0	11	0.64	2.05	36.2	0.4
1.006	106.033	0.000	0.0	20	0.0	24	0.50	0.95	16.9	0.9

Phase 2 - Foul Water Network 2

Barratt Homes Manchester		Page 0
4 Brindley Road City Park, Manchester Cheshire M169HQ		
Date 28/09/2021 10:29	Designed by doyleco	
File CHIPPING LANE 21.09.21.MDX	Checked by	
Innovyze	Network 2020.1.3	

FOUL SEWERAGE DESIGN











Design Criteria for Foul Network 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500


Designed with Level Soffits

Network Design Table for Foul Network 2





PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	19.011	0.190	100.1	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
1.001	17.079	0.127	134.5	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.002	41.497	0.384	108.1	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
2.000	23.674	0.696	34.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
2.001	30.655	1.482	20.7	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.003	33.461	0.903	37.1	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
1.004	18.393	0.136	135.2	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
1.005	19.269	0.143	134.7	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
1.006	25.847	0.897	28.8	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
3.000	19.008	0.190	100.0	0.000	15	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	E Area (ha)	E Base Flow (l/s)	E Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	113.450	0.000	0.0	8	0.0	16	0.36	0.88	15.5	0.4
1.001	113.260	0.000	0.0	8	0.0	17	0.32	0.75	13.3	0.4
1.002	113.133	0.000	0.0	13	0.0	21	0.40	0.84	14.9	0.6
2.000	114.927	0.000	0.0	3	0.0	8	0.37	1.51	26.6	0.1
2.001	114.231	0.000	0.0	3	0.0	7	0.44	1.93	34.1	0.1
1.003	112.749	0.000	0.0	21	0.0	20	0.68	1.44	25.5	1.0
1.004	111.846	0.000	0.0	25	0.0	30	0.46	0.75	13.3	1.2
1.005	111.710	0.000	0.0	28	0.0	32	0.47	0.75	13.3	1.3
1.006	111.567	0.000	0.0	28	0.0	22	0.81	1.64	28.9	1.3
3.000	110.860	0.000	0.0	15	0.0	22	0.43	0.88	15.5	0.7


Barratt Homes Manchester		Page 1
4 Brindley Road City Park, Manchester Cheshire M169HQ		
Date 28/09/2021 10:29 File CHIPPING LANE 21.09.21.MDX	Designed by doyleco Checked by	
Innovyze		Network 2020.1.3

Network Design Table for Foul Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.007	35.335	0.262	134.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
1.008	21.005	1.541	13.6	0.000	6	0.0	1.500	o	150	Pipe/Conduit		
4.000	41.037	0.304	135.0	0.000	9	0.0	1.500	o	150	Pipe/Conduit		
1.009	47.405	0.627	75.6	0.000	12	0.0	1.500	o	150	Pipe/Conduit		







Network Results Table

PN	US/IL (m)	E Area (ha)	E Base Flow (l/s)	E Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.007	110.670	0.000	0.0	43	0.0	39	0.54	0.75	13.3	2.0
1.008	110.408	0.000	0.0	49	0.0	24	1.25	2.38	42.1	2.3
4.000	109.171	0.000	0.0	9	0.0	18	0.33	0.75	13.3	0.4
1.009	108.867	0.000	0.0	70	0.0	43	0.76	1.01	17.8	3.2

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Manhole Schedules for Foul Network 2

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out		Pipes In			Backdrop (mm)
						Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	Diameter (mm)	
F201	116.004	2.554	Open Manhole	1200	1.000	113.450	150				
F202	115.678	2.418	Open Manhole	1200	1.001	113.260	150	1.000	113.260	150	
F203	115.449	2.316	Open Manhole	1200	1.002	113.133	150	1.001	113.133	150	
F204	116.727	1.800	Open Manhole	1200	2.000	114.927	150				
F205	116.037	1.806	Open Manhole	1200	2.001	114.231	150	2.000	114.231	150	
F206	115.110	2.361	Open Manhole	1350	1.003	112.749	150	1.002	112.749	150	
								2.001	112.749	150	
F207	114.027	2.181	Open Manhole	1200	1.004	111.846	150	1.003	111.846	150	
F208	113.592	1.882	Open Manhole	1350	1.005	111.710	150	1.004	111.710	150	
F209	113.271	1.704	Open Manhole	1200	1.006	111.567	150	1.005	111.567	150	
F210	113.209	2.349	Open Manhole	1200	3.000	110.860	150				
F211	112.960	2.290	Open Manhole	1350	1.007	110.670	150	1.006	110.670	150	
								3.000	110.670	150	
F212	112.258	1.850	Open Manhole	1200	1.008	110.408	150	1.007	110.408	150	
F213	110.962	1.791	Open Manhole	1200	4.000	109.171	150				
F214	111.576	2.709	Open Manhole	1350	1.009	108.867	150	1.008	108.867	150	
								4.000	108.867	150	
F20	109.898	1.658	Open Manhole	1200		OUTFALL		1.009	108.240	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F201	360511.445	437892.161	360511.445	437892.161	Required	
F202	360496.874	437879.950	360496.874	437879.950	Required	
F203	360487.094	437865.949	360487.094	437865.949	Required	
F204	360525.779	437821.377	360525.779	437821.377	Required	
F205	360502.279	437818.513	360502.279	437818.513	Required	
F206	360472.818	437826.985	360472.818	437826.985	Required	

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Manhole Schedules for Foul Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F207	360440.629	437836.123	360440.629	437836.123	Required	
F208	360428.727	437850.145	360428.727	437850.145	Required	
F209	360424.604	437868.968	360424.604	437868.968	Required	
F210	360429.710	437904.575	360429.710	437904.575	Required	
F211	360414.742	437892.859	360414.742	437892.859	Required	
F212	360379.412	437893.476	360379.412	437893.476	Required	
F213	360339.489	437866.868	360339.489	437866.868	Required	
F214	360360.317	437902.228	360360.317	437902.228	Required	
F20	360321.419	437929.324			No Entry	

Phase 2 - Foul Water Network 3

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FOUL SEWERAGE DESIGN











Design Criteria for Foul Network 3

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500


Designed with Level Soffits

Network Design Table for Foul Network 3











PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	60.334	0.603	100.1	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
2.000	56.779	2.969	19.1	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
1.001	75.976	2.250	33.8	0.000	12	0.0	1.500	o	150	Pipe/Conduit	
3.000	28.239	0.466	60.6	0.000	13	0.0	1.500	o	150	Pipe/Conduit	
1.002	46.479	1.343	34.6	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
1.003	24.445	0.707	34.6	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
1.004	31.403	0.908	34.6	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.005	32.574	0.937	34.8	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
1.006	17.710	0.131	135.2	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
1.007	26.316	0.195	135.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	E Area (ha)	E Base Flow (l/s)	E Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	114.507	0.000	0.0	7	0.0	15	0.34	0.88	15.5	0.3
2.000	116.873	0.000	0.0	6	0.0	10	0.57	2.01	35.5	0.3
1.001	113.904	0.000	0.0	25	0.0	22	0.74	1.51	26.7	1.2
3.000	112.120	0.000	0.0	13	0.0	18	0.49	1.13	19.9	0.6
1.002	111.654	0.000	0.0	43	0.0	28	0.87	1.49	26.4	2.0
1.003	110.311	0.000	0.0	49	0.0	30	0.91	1.49	26.4	2.3
1.004	109.604	0.000	0.0	49	0.0	30	0.91	1.49	26.4	2.3
1.005	108.696	0.000	0.0	51	0.0	31	0.92	1.49	26.3	2.4
1.006	107.759	0.000	0.0	58	0.0	46	0.59	0.75	13.3	2.7
1.007	107.628	0.000	0.0	61	0.0	47	0.60	0.75	13.3	2.8


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Network Design Table for Foul Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.008	28.432	0.211	134.7	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.009	14.716	0.154	95.6	0.000	9	0.0	1.500	o	150	Pipe/Conduit	
4.000	22.656	2.248	10.1	0.000	15	0.0	1.500	o	150	Pipe/Conduit	
1.010	9.126	0.091	100.3	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
5.000	29.446	0.260	113.3	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
5.001	23.998	0.213	112.7	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
1.011	57.766	1.457	39.6	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.012	25.668	0.190	135.1	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.013	25.667	0.145	177.0	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
1.014	26.249	0.141	186.2	0.000	4	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table




PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.008	107.433	0.000	0.0	61	0.0	0.60	0.75	13.3	2.8
1.009	107.222	0.000	0.0	70	0.0	0.70	0.90	15.8	3.2
4.000	109.317	0.000	0.0	15	0.0	0.96	2.77	49.0	0.7
1.010	107.068	0.000	0.0	85	0.0	0.73	0.87	15.5	3.9
5.000	107.450	0.000	0.0	8	0.0	0.34	0.82	14.5	0.4
5.001	107.190	0.000	0.0	16	0.0	0.42	0.82	14.6	0.7
1.011	106.977	0.000	0.0	101	0.0	1.07	1.39	24.6	4.7
1.012	105.520	0.000	0.0	101	0.0	0.69	0.75	13.3	4.7
1.013	105.255	0.000	0.0	104	0.0	0.61	0.86	34.3	4.8
1.014	105.110	0.000	0.0	108	0.0	0.60	0.84	33.4	5.0

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Manhole Schedules for Foul Network 3

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out		Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	
F301	116.381	1.874	Open Manhole	1350	1.000	114.507	150			
F302	118.700	1.827	Open Manhole	1200	2.000	116.873	150			
F303	116.825	2.921	Open Manhole	1800	1.001	113.904	150	1.000	113.904	150
								2.000	113.904	150
F305	114.524	2.404	Open Manhole	1200	3.000	112.120	150			
F306	114.309	2.655	Open Manhole	1350	1.002	111.654	150	1.001	111.654	150
								3.000	111.654	150
F307	112.576	2.265	Open Manhole	1200	1.003	110.311	150	1.002	110.311	150
F308	111.640	2.036	Open Manhole	1350	1.004	109.604	150	1.003	109.604	150
F309	111.857	3.161	Open Manhole	1200	1.005	108.696	150	1.004	108.696	150
F310	111.492	3.733	Open Manhole	1200	1.006	107.759	150	1.005	107.759	150
F311	111.216	3.588	Open Manhole	1350	1.007	107.628	150	1.006	107.628	150
F312	110.710	3.277	Open Manhole	1200	1.008	107.433	150	1.007	107.433	150
F313	110.267	3.045	Open Manhole	1200	1.009	107.222	150	1.008	107.222	150
F314	111.086	1.769	Open Manhole	1200	4.000	109.317	150			
F315	110.112	3.044	Open Manhole	1200	1.010	107.068	150	1.009	107.068	150
								4.000	107.069	150
F316	109.169	1.719	Open Manhole	1350	5.000	107.450	150			
F317	109.853	2.663	Open Manhole	1350	5.001	107.190	150	5.000	107.190	150
F318	109.682	2.705	Open Manhole	1350	1.011	106.977	150	1.010	106.977	150
								5.001	106.977	150
F319	107.323	1.803	Open Manhole	1200	1.012	105.520	150	1.011	105.520	150
F320	107.336	2.081	Open Manhole	1350	1.013	105.255	225	1.012	105.330	150
F321	106.984	1.874	Open Manhole	1200	1.014	105.110	225	1.013	105.110	225
F23	106.952	1.983	Open Manhole	1200		OUTFALL		1.014	104.969	225

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MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F301	360534.166	437908.238	360534.166	437908.238	Required	
F302	360616.360	437898.323	360616.360	437898.323	Required	
F303	360582.715	437944.060	360582.715	437944.060	Required	

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Manhole Schedules for Foul Network 3

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F305	360514.794	437988.492	360514.794	437988.492	Required	
F306	360537.578	438005.175	360537.578	438005.175	Required	
F307	360510.027	438042.608	360510.027	438042.608	Required	
F308	360495.925	438062.576	360495.925	438062.576	Required	
F309	360469.391	438045.780	360469.391	438045.780	Required	
F310	360441.868	438028.358	360441.868	438028.358	Required	
F311	360424.802	438023.626	360424.802	438023.626	Required	
F312	360399.443	438016.594	360399.443	438016.594	Required	
F313	360374.699	438002.590	360374.699	438002.590	Required	
F314	360381.771	437977.818	360381.771	437977.818	Required	
F315	360364.270	437992.207	360364.270	437992.207	Required	
F316	360314.887	437966.073	360314.887	437966.073	Required	
F317	360339.658	437981.726	360339.658	437981.726	Required	
F318	360357.194	437997.970	360357.194	437997.970	Required	
F319	360319.984	438042.155	360319.984	438042.155	Required	

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Manhole Schedules for Foul Network 3

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F320	360299.350	438026.888	360299.350	438026.888	Required	
F321	360278.717	438011.621	360278.717	438011.621	Required	
F23	360259.016	437994.275			No Entry	