

DRAINAGE CONDITION REPORT

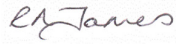
for

CASSEL & FLETCHER

at

**FORMER WORKSHOP
ARKADY INDUSTRIAL ESTATE
BRISCOE LANE, MANCHESTER, M40 2XG**

Quality Management

Job No	12123		
Project	Briscoe Lane		
Location	Former Workshop, Arkady Industrial Estate, Briscoe Lane, Manchester M40 2XG		
Title	Drainage Condition Report		
Document Ref	-	Issue / Revision	01
File reference	S:\CONTRACTS\12123\12123-Briscoe Lane - Drainage Condition Report.docx		
Date	18 th December 2020		
Prepared by	R Andrew James MEng CEng MStructE	Signature (for file)	
Checked by	Mark B Donohue BEng(hons) CEng MStructE	Signature (for file)	

Revision History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked
01	18/12/20	Final Issue	AJ	MD

Contents

1	Introduction	3
2	Drainage Strategy	4
2.1	Existing Drainage.....	4
2.2	Existing Runoff.....	4
2.3	SuDS Hierarchal Approach	5
2.4	Surface Water Drainage Strategy	5
2.5	Maintenance	6
3	Drainage Related Planning Condition and Responses	7
3.1	Planning Conditions	7

Appendix A – Marston & Grundy Drawings

Appendix B – Hydraulic Calculations

1 Introduction

- 1.1 In 2019 a planning application was submitted to Manchester City Council for the construction of a new industrial building in replacement of a previous similar building that had burnt down. No drainage information was submitted with the application. Planning approval was granted in May 2020 (Ref: 123295/FO/2019) subject to a number of planning conditions.
- 1.2 This report has been prepared to remove the one drainage related planning condition relevant to the application. This is condition No.4.

2 Drainage Strategy

2.1 Existing Drainage

The United Utilities sewer records have been reviewed and confirm that there are a number of combined water sewers within Briscoe Lane to the south east of the site. There are no surface water sewers in close proximity to the site.

A CCTV survey has been completed to understand the route and condition of existing drainage serving the current building. This has confirmed a 150mm combined drain at the front of the building and a 225mm combined drain at the rear.

2.2 Existing Runoff

The existing site is fully impermeable and runoff goes to the combined water sewers via the two existing connections. Figure 1 below indicates the existing rates based on an average storm event of 50mm/hr. A 50% reduction has then been applied to satisfy the Manchester CC policy for Brownfield developments.

Zone	Ex Impermeable Area (m²)	Peak Flow Rate @ 50mm/Hr	Existing peak flow rates less 50%
Front	1340	18.6 l/s	9.3 l/s
Back	2770	38.5 l/s	19.3 l/s

Figure 1 Existing Brownfield Runoff Rates

2.3 SuDS Hierarchal Approach

Based on the existing drainage configuration, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Not possible as a trial pit investigation of local ground conditions has confirmed that the underlying ground is clay and thus not suitable for infiltration.
Connection to Watercourse	No	There is no watercourse in close proximity to the site.
Connection to Surface Water Sewer	No	There is no surface water sewer in close proximity to the site
Connection to Combined Water Sewer	Yes	Reuse the existing connections to the combined water public sewer.

Figure 2 SuDS Hierarchal Approach

2.4 Surface Water Drainage Strategy

The general principal of the surface water drainage strategy is to collect the runoff from the roof of the new industrial building and direct it to a number of new RWP's that will drop down to a new surface water network on either side. The new drainage will then outfall to the existing private drainage connections that ultimately outfall to the combined water public sewer.

As there is limited space for attenuation measures at the front of the building, a greater flow rate has been applied to this connection. The rear outfall then has a lower discharge rate so that the overall is still less than the pre development 28.6l/s. Refer to the table below and the detailed hydraulic calculations in Appendix B.

Zone	30yr	100yr + 20% CC
Front	14.1 l/s	20.2 l/s
Rear	4.6 l/s	7.7 l/s
Total	18.7 l/s	27.9 l/s

Figure 3 Post Development Peak Flow Rates

2.5 Maintenance

The long-term maintenance of the new drainage infrastructure will be with the owners /occupies of the new industrial development in line with best practice guidance. Annual inspections will need to be carried out and clearing of gullies, channel drains and catch pits constructed.

3 Drainage Related Planning Condition and Responses

3.1 Planning Conditions

The detailed planning condition is listed below in *italics* with the Infrastructure Design Response in Blue below.

Condition 4.

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

Notwithstanding the information contained within the submitted Drainage Strategy, the following additional information shall be submitted to and agreed in writing by the City Council as Local Planning Authority.

- a Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event with allowance for climate change in any part of a building;*

Refer to the Drainage GA drawing in Appendix A and the details hydraulic Calculations in Appendix B. These clearly indicates no flooding within the building for the 100yr + climate change event.

- b Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow rates need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes need to be presented with appreciation of these overland flows routes with regards to the properties on site and adjacent properties off site;*

Refer to M&G drawing C-0201 in Appendix A which shows the two small areas of exceedance flooding. None of this water will pass off the site boundary.

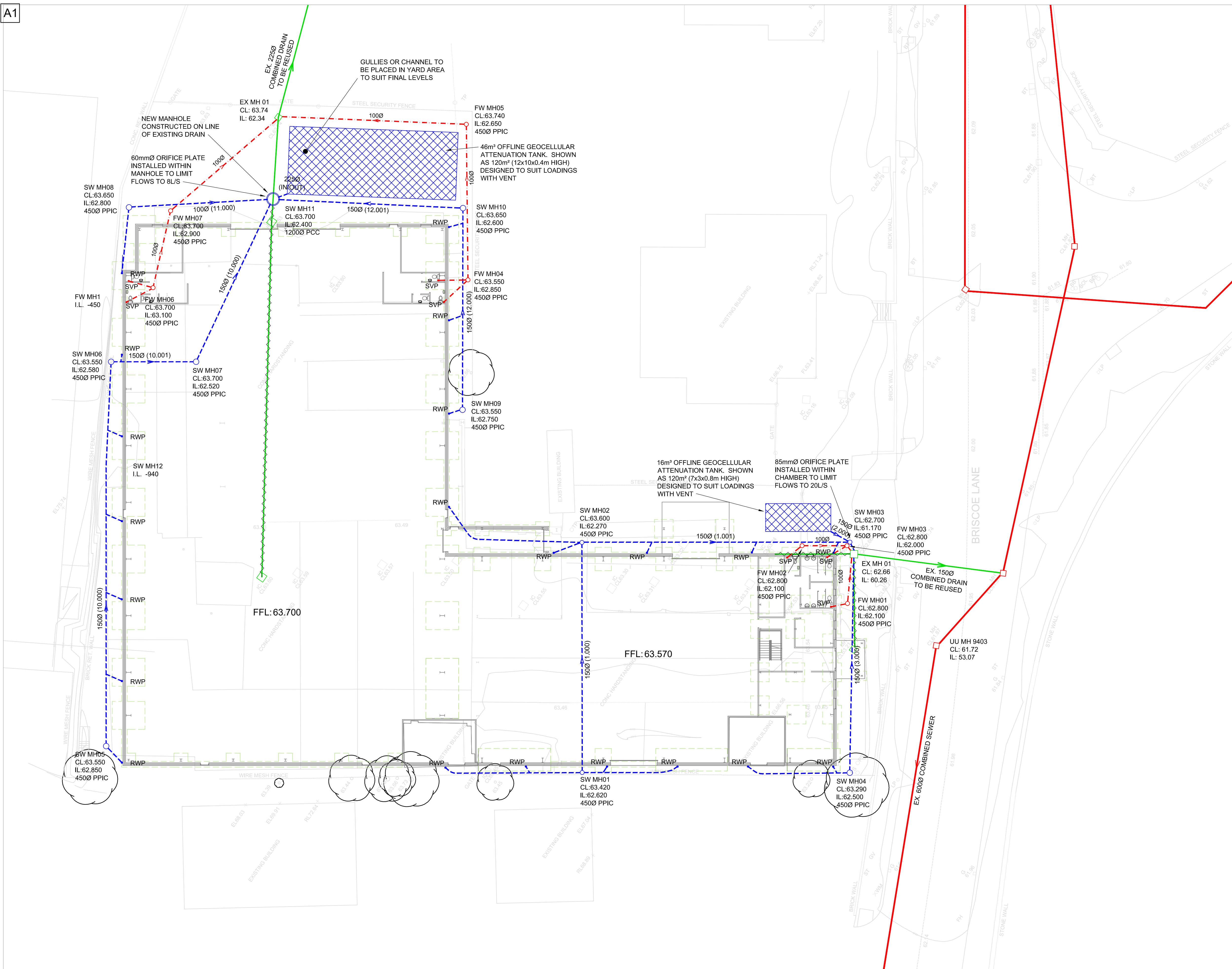
- c Hydraulic Calculation of the proposed drainage system;*

Refer to Appendix B for full hydraulic calculations for both the front and rear networks.

- d Construction details of flow control and SuDS elements.*

Refer to the drainage details drawing C-0202 in Appendix A.

Appendix A – Marston & Grundy Drawings

**NOTES**

This drawing is copyright and owned by Marston and Grundy LLP, and is for use on this site only unless contractually stated otherwise.

DO NOT SCALE this drawing (printed or electronic versions). Contractors must check all dimensions from site.

All other design team elements, where indicated, have been imported from the consultant's drawings and reference should be made to the individual consultant's drawings for exact setting out, size and type of component.

Discrepancies and / or ambiguities within this drawing, between it and information given elsewhere, must be reported immediately to the architect for clarification before proceeding.

All works are to be carried out in accordance with the latest British Standards and Codes of Practice unless specifically directed otherwise in the specification.

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DRAWING STATUS

S0 = Work In Progress S1 = Co-Ordination S2 = Information
S3 = Review / Comment S4 = Approval D1 = Costing D2 = Tender
D3 = Contractor Design D4 = Construction FC = Final Construction

KEY

- EXISTING COMBINED WATER PUBLIC SEWER
- EXISTING COMBINED PRIVATE DRAIN
- EXISTING COMBINED PRIVATE DRAIN TO BE ABANDONED
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- SVP SOIL VENT PIPE
- RWP RAINWATER PIPE

P1	PRELIMINARY ISSUE	PG	18.12.20	MD
Rev	Description	By	Date	Chk'd

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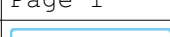
Client
CASSEL & FLETCHER

Project
**BRISCOE LANE
PROPOSED REBUILD**

Drawing
DRAINAGE GA

Purpose of Issue PRELIMINARY		Status S1		
Project No. 12123	Scale @ A1 1:200	Date 18.12.20	Drawn PG	Checked MD
Drawing Identifier project origin zone level file type role number Revision BRL-MAG-ZZ-XX-DR-C-0200 P1				

Appendix B – Hydraulic Calculations

		Page 1
	Briscoe Lane Front SW Network	
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Micro Drainage	Network 2018.1	

Briscoe Lane
Front SW Network



Date 20/12/2020 13:49
File Briscoe Lane - Front Ne...

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Micro Drainage

Network 2018.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.002	2.000	0.113	17.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
3.000	23.000	0.800	28.8	0.015	4.00	0.0	0.600	o	150	Pipe/Conduit		
1.003	16.000	0.160	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow
1.002	50.00	4.61	61.170	0.132	0.0	0.0	0.0	2.41	42.5	17.9
3.000	50.00	4.20	62.500	0.015	0.0	0.0	0.0	1.88	33.3	2.0
1.003	50.00	4.87	60.260	0.147	0.0	0.0	0.0	1.00	17.8«	19.9

		Page 3
Briscoe Lane Front SW Network		
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Micro Drainage	Network 2018.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
1.000	o	150	S1	63.420	62.620	0.650	Open Manhole		450
1.001	o	150	S2	63.600	62.270	1.180	Open Manhole		450
2.000	o	150	Tank	62.700	61.200	1.350	Open Manhole		0
1.002	o	150	S3	62.700	61.170	1.380	Open Manhole		450
3.000	o	150	S4	63.290	62.500	0.640	Open Manhole		450
1.003	o	150	EX	62.660	60.260	2.250	Open Manhole		1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
1.000	25.000	71.4	S2	63.600	62.270	1.180	Open Manhole		450
1.001	29.000	26.4	S3	62.700	61.170	1.380	Open Manhole		450
2.000	3.000	100.0	S3	62.700	61.170	1.380	Open Manhole		450
1.002	2.000	17.7	EX	62.660	61.057	1.453	Open Manhole		1200
3.000	23.000	28.8	EX	62.660	61.700	0.810	Open Manhole		1200
1.003	16.000	100.0		67.910	60.100	7.660	Open Manhole		0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003		67.910	60.100	54.000	0	0

Simulation Criteria for Storm

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

		Page 4																				
	Briscoe Lane Front SW Network																					
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Micro Drainage	Network 2018.1																					
Simulation Criteria for Storm Number of Time/Area Diagrams 0 Number of Real Time Controls 0 Synthetic Rainfall Details <table><tr><td>Rainfall Model</td><td>FSR</td><td>Profile Type</td><td>Summer</td></tr><tr><td>Return Period (years)</td><td>2</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>M5-60 (mm)</td><td>18.000</td><td>Storm Duration (mins)</td><td>30</td></tr><tr><td>Ratio R</td><td>0.357</td><td></td><td></td></tr></table>			Rainfall Model	FSR	Profile Type	Summer	Return Period (years)	2	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	18.000	Storm Duration (mins)	30	Ratio R	0.357		
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Ratio R	0.357																					
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		Page 5
	Briscoe Lane Front SW Network	
Date 20/12/2020 13:49 File Briscoe Lane - Front Ne...	Designed by PG Checked by	
Micro Drainage	Network 2018.1	
Online Controls for Storm Orifice Manhole: S3, DS/PN: 1.002, Volume (m³): 0.8 Diameter (m) 0.085 Discharge Coefficient 0.600 Invert Level (m) 61.170		
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		Page 6																																																																																				
	Briscoe Lane Front SW Network																																																																																					
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Micro Drainage	Network 2018.1																																																																																					
Storage Structures for Storm Cellular Storage Manhole: Tank, DS/PN: 2.000 Invert Level (m) 61.200 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>20.0</td><td>20.0</td><td>2.600</td><td>0.0</td><td>34.3</td></tr><tr><td>0.200</td><td>20.0</td><td>23.6</td><td>2.800</td><td>0.0</td><td>34.3</td></tr><tr><td>0.400</td><td>20.0</td><td>27.2</td><td>3.000</td><td>0.0</td><td>34.3</td></tr><tr><td>0.600</td><td>20.0</td><td>30.7</td><td>3.200</td><td>0.0</td><td>34.3</td></tr><tr><td>0.800</td><td>20.0</td><td>34.3</td><td>3.400</td><td>0.0</td><td>34.3</td></tr><tr><td>0.801</td><td>0.0</td><td>34.3</td><td>3.600</td><td>0.0</td><td>34.3</td></tr><tr><td>1.200</td><td>0.0</td><td>34.3</td><td>3.800</td><td>0.0</td><td>34.3</td></tr><tr><td>1.400</td><td>0.0</td><td>34.3</td><td>4.000</td><td>0.0</td><td>34.3</td></tr><tr><td>1.600</td><td>0.0</td><td>34.3</td><td>4.200</td><td>0.0</td><td>34.3</td></tr><tr><td>1.800</td><td>0.0</td><td>34.3</td><td>4.400</td><td>0.0</td><td>34.3</td></tr><tr><td>2.000</td><td>0.0</td><td>34.3</td><td>4.600</td><td>0.0</td><td>34.3</td></tr><tr><td>2.200</td><td>0.0</td><td>34.3</td><td>4.800</td><td>0.0</td><td>34.3</td></tr><tr><td>2.400</td><td>0.0</td><td>34.3</td><td>5.000</td><td>0.0</td><td>34.3</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	20.0	20.0	2.600	0.0	34.3	0.200	20.0	23.6	2.800	0.0	34.3	0.400	20.0	27.2	3.000	0.0	34.3	0.600	20.0	30.7	3.200	0.0	34.3	0.800	20.0	34.3	3.400	0.0	34.3	0.801	0.0	34.3	3.600	0.0	34.3	1.200	0.0	34.3	3.800	0.0	34.3	1.400	0.0	34.3	4.000	0.0	34.3	1.600	0.0	34.3	4.200	0.0	34.3	1.800	0.0	34.3	4.400	0.0	34.3	2.000	0.0	34.3	4.600	0.0	34.3	2.200	0.0	34.3	4.800	0.0	34.3	2.400	0.0	34.3	5.000	0.0	34.3
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																	
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0.800	20.0	34.3	3.400	0.0	34.3																																																																																	
0.801	0.0	34.3	3.600	0.0	34.3																																																																																	
1.200	0.0	34.3	3.800	0.0	34.3																																																																																	
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		Briscoe Lane Front SW Network		Page 7													
Date 20/12/2020 13:49 File Briscoe Lane - Front Ne...		Designed by PG Checked by															
Micro Drainage		Network 2018.1															
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>																	
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 0.357													
Region England and Wales Cv (Summer)		0.750															
M5-60 (mm)		18.000 Cv (Winter)		0.840													
Margin for Flood Risk Warning (mm)				300.0													
Analysis Timestep		2.5 Second Increment (Extended)															
DTS Status				OFF													
DVD Status				ON													
Inertia Status				ON													
Profile(s)				Summer and Winter													
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440															
Return Period(s) (years)				1, 30, 100													
Climate Change (%)				0, 0, 20													
US/MH		Return Climate		First (X)		First (Y)		First (Z)		Overflow							
PN		Name		Storm		Period		Change		Surcharge		Flood		Overflow		Act.	
1.000		S1		15		Winter		1		+0%		30/15		Summer		100/15 Summer	
1.001		S2		15		Winter		1		+0%		30/15		Summer			
2.000		Tank		30		Winter		1		+0%		30/15		Summer		100/30 Winter	
1.002		S3		15		Winter		1		+0%		1/15		Summer		100/30 Winter	
3.000		S4		15		Winter		1		+0%							
1.003		EX		15		Summer		1		+0%		100/15		Summer			
		Water		Surcharged		Flooded				Pipe							
US/MH		Level		Depth		Volume		Flow / Overflow		Flow				Level			
PN		Name		(m)		(m)		(m³)		Cap.		(l/s)		(l/s)		Status	
1.000		S1		62.678		-0.092		0.000		0.32				6.4		OK	
1.001		S2		62.340		-0.080		0.000		0.44				14.7		OK	
2.000		Tank		61.343		-0.007		0.000		0.27				2.9		OK	
1.002		S3		61.380		0.060		0.000		0.29				6.2		SURCHARGED	
3.000		S4		62.524		-0.126		0.000		0.06				1.9		OK	
1.003		EX		60.334		-0.076		0.000		0.49				8.1		OK	

		Briscoe Lane Front SW Network		Page 8				
Date 20/12/2020 13:49 File Briscoe Lane - Front Ne...		Designed by PG Checked by						
Micro Drainage		Network 2018.1						
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
Simulation Criteria								
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow 0.000				
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage 2.000				
Hot Start Level (mm)		0		Inlet Coefficient 0.800				
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day) 0.000				
Foul Sewage per hectare (l/s)		0.000						
Number of Input Hydrographs		0		Number of 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 0.357				
Region England and Wales Cv (Summer)		0.750						
M5-60 (mm)		18.000		Cv (Winter) 0.840				
Margin for Flood Risk Warning (mm)				300.0				
Analysis Timestep		2.5 Second Increment (Extended)						
DTS Status				OFF				
DVD Status				ON				
Inertia Status				ON				
Profile(s)				Summer and Winter				
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440						
Return Period(s) (years)				1, 30, 100				
Climate Change (%)				0, 0, 20				
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S1	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
1.001	S2	15 Winter	30	+0%	30/15 Summer			
2.000	Tank	30 Winter	30	+0%	30/15 Summer	100/30 Winter		
1.002	S3	30 Winter	30	+0%	1/15 Summer	100/30 Winter		
3.000	S4	15 Winter	30	+0%				
1.003	EX	15 Winter	30	+0%	100/15 Summer			
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Pipe Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	62.923	0.153	0.000	0.70	14.1	SURCHARGED	4
1.001	S2	62.787	0.367	0.000	1.00	33.5	SURCHARGED	
2.000	Tank	61.760	0.410	0.000	0.79	8.6	SURCHARGED	1
1.002	S3	61.789	0.469	0.000	0.54	11.3	SURCHARGED	1
3.000	S4	62.538	-0.112	0.000	0.15	4.7	OK	
1.003	EX	60.368	-0.042	0.000	0.86	14.1	OK	
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Briscoe Lane
Front SW Network



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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of 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	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 20

US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.
1.000	S1	15 Winter	100	+20%	30/15 Summer	100/15 Summer		
1.001	S2	15 Summer	100	+20%	30/15 Summer			
2.000	Tank	30 Winter	100	+20%	30/15 Summer	100/30 Winter		
1.002	S3	30 Winter	100	+20%	1/15 Summer	100/30 Winter		
3.000	S4	15 Winter	100	+20%				
1.003	EX	30 Winter	100	+20%	100/15 Summer			

PN	US/MH Name	Water	Surcharged	Flooded	Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
1.000	S1	63.423	0.653	2.697	1.12	22.3	FLOOD	4
1.001	S2	63.473	1.053	0.000	1.21	40.3	FLOOD RISK	
2.000	Tank	62.700	1.350	0.050	1.09	11.8	FLOOD	1
1.002	S3	62.700	1.380	0.501	0.87	18.4	FLOOD	1
3.000	S4	62.549	-0.101	0.000	0.23	7.3	OK	
1.003	EX	60.486	0.076	0.000	1.23	20.2	SURCHARGED	

		Page 1
	Briscoe Lane Rear SW Network	
Date 20/12/2020 13:48 File Briscoe Lane - Rear Net...	Designed by PG Checked by	
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes Pipe Manhole Sizes Manhole

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.353	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.152	4-8	0.038

Total Area Contributing (ha) = 0.190

Total Pipe Volume (m³) = 2.269

Network Design Table for Storm

« - 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
10.000	41.000	0.273	150.2	0.060	4.00	0.0	0.600	o	150	Pipe/Conduit	
10.001	9.000	0.060	150.0	0.023	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.002	19.000	0.127	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
11.000	15.000	0.150	100.0	0.017	4.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
10.000	50.00	4.84	62.850	0.060	0.0	0.0	0.0	0.82	14.4	8.1
10.001	50.00	5.02	62.577	0.083	0.0	0.0	0.0	0.82	14.5	11.2
10.002	50.00	5.41	62.517	0.083	0.0	0.0	0.0	0.82	14.5	11.2
11.000	50.00	4.33	62.800	0.017	0.0	0.0	0.0	0.77	6.0	2.3

Briscoe Lane
Rear SW Network



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Date 20/12/2020 13:48
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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
12.000	22.000	0.147	149.7	0.045	4.00	0.0	0.600	o	150	Pipe/Conduit	
12.001	21.000	0.140	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
13.000	3.000	0.030	100.0	0.000	4.00	0.0	0.600	o	225	Pipe/Conduit	
10.003	3.000	0.030	100.0	0.045	0.00	0.0	0.600	o	150	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)
12.000	50.00	4.45	62.750	0.045	0.0	0.0	0.0	0.82	14.5	6.1
12.001	50.00	4.88	62.603	0.045	0.0	0.0	0.0	0.82	14.5	6.1
13.000	50.00	4.04	62.500	0.000	0.0	0.0	0.0	1.31	52.0	0.0
10.003	50.00	5.46	62.400	0.190	0.0	0.0	0.0	1.00	17.8	25.7

		Page 3
	Briscoe Lane Rear SW Network	
Date 20/12/2020 13:48 File Briscoe Lane - Rear Net...	Designed by PG Checked by	
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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.000	o	150	S5	63.550	62.850	0.550	Open Manhole	450
10.001	o	150	S6	63.550	62.577	0.823	Open Manhole	450
10.002	o	150	S7	63.700	62.517	1.033	Open Manhole	450
11.000	o	100	S8	63.650	62.800	0.750	Open Manhole	450
12.000	o	150	S10	63.550	62.750	0.650	Open Manhole	450
12.001	o	150	S11	63.650	62.603	0.897	Open Manhole	450
13.000	o	225	tank	63.700	62.500	0.975	Open Manhole	0
10.003	o	150	S12	63.740	62.400	1.190	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.000	41.000	150.2	S6	63.550	62.577	0.823	Open Manhole	450
10.001	9.000	150.0	S7	63.700	62.517	1.033	Open Manhole	450
10.002	19.000	150.0	S12	63.740	62.390	1.200	Open Manhole	1200
11.000	15.000	100.0	S12	63.740	62.650	0.990	Open Manhole	1200
12.000	22.000	149.7	S11	63.650	62.603	0.897	Open Manhole	450
12.001	21.000	150.0	S12	63.740	62.463	1.127	Open Manhole	1200
13.000	3.000	100.0	S12	63.740	62.470	1.045	Open Manhole	1200
10.003	3.000	100.0		63.740	62.370	1.220	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
10.003		63.740	62.370	63.340	0	0

		Page 4
	Briscoe Lane Rear SW Network	
Date 20/12/2020 13:48 File Briscoe Lane - Rear Net...	Designed by PG Checked by	
Micro Drainage	Network 2018.1	
Simulation Criteria for Storm Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coeffiecient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of 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) 18.000 Storm Duration (mins) 30 Ratio R 0.353		
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		Page 5
	Briscoe Lane Rear SW Network	
Date 20/12/2020 13:48 File Briscoe Lane - Rear Net...	Designed by PG Checked by	
Micro Drainage	Network 2018.1	
<u>Online Controls for Storm</u> <u>Orifice Manhole: S12, DS/PN: 10.003, Volume (m³): 2.4</u> Diameter (m) 0.060 Discharge Coefficient 0.600 Invert Level (m) 62.400		
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		Page 6
	Briscoe Lane Rear SW Network	
Date 20/12/2020 13:48 File Briscoe Lane - Rear Net...	Designed by PG Checked by	
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Storage Structures for Storm

Cellular Storage Manhole: tank, DS/PN: 13.000

Invert Level (m) 62.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	120.0	2.600	0.0	137.5
0.200	120.0	128.8	2.800	0.0	137.5
0.400	120.0	137.5	3.000	0.0	137.5
0.401	0.0	137.5	3.200	0.0	137.5
0.800	0.0	137.5	3.400	0.0	137.5
1.000	0.0	137.5	3.600	0.0	137.5
1.200	0.0	137.5	3.800	0.0	137.5
1.400	0.0	137.5	4.000	0.0	137.5
1.600	0.0	137.5	4.200	0.0	137.5
1.800	0.0	137.5	4.400	0.0	137.5
2.000	0.0	137.5	4.600	0.0	137.5
2.200	0.0	137.5	4.800	0.0	137.5
2.400	0.0	137.5	5.000	0.0	137.5

		Page 7						
		Briscoe Lane Rear SW Network						
Date 20/12/2020 13:48 File Briscoe Lane - Rear Net...	Designed by PG Checked by							
Micro Drainage	Network 2018.1							
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>								
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 0.353						
Region England and Wales Cv (Summer) 0.750								
M5-60 (mm) 18.000		Cv (Winter) 0.840						
Margin for Flood Risk Warning (mm)		300.0						
Analysis Timestep 2.5 Second Increment (Extended)								
DTS Status		OFF						
DVD Status		ON						
Inertia Status		ON						
Profile(s)		Summer and Winter						
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440						
Return Period(s) (years)		1, 30, 100						
Climate Change (%)		0, 0, 20						
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	S5	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
10.001	S6	15 Winter	1	+0%	1/15 Summer			
10.002	S7	15 Winter	1	+0%	1/15 Summer			
11.000	S8	15 Winter	1	+0%	30/15 Summer			
12.000	S10	15 Winter	1	+0%	30/15 Summer			
12.001	S11	15 Winter	1	+0%	1/15 Summer			
13.000	tank	60 Winter	1	+0%	30/60 Winter			
10.003	S12	15 Winter	1	+0%	1/15 Summer			
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
10.000	S5	62.929	-0.071	0.000	0.52	7.3	OK	5
10.001	S6	62.828	0.101	0.000	0.70	9.0	SURCHARGED	
10.002	S7	62.796	0.129	0.000	0.65	8.9	SURCHARGED	
11.000	S8	62.843	-0.057	0.000	0.38	2.2	OK	
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Briscoe Lane
Rear SW Network



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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of 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	0.353
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 20

	US/MH		Return	Climate	First (X)		First (Y)		First (Z)	Overflow
PN	Name	Storm	Period	Change	Surcharge		Flood		Overflow	Act.
10.000	S5	15 Winter	100	+20%	30/15	Summer	100/15	Summer		
10.001	S6	120 Winter	100	+20%	1/15	Summer				
10.002	S7	120 Winter	100	+20%	1/15	Summer				
11.000	S8	120 Winter	100	+20%	30/15	Summer				
12.000	S10	120 Winter	100	+20%	30/15	Summer				
12.001	S11	120 Winter	100	+20%	1/15	Summer				
13.000	tank	120 Winter	100	+20%	30/60	Winter				
10.003	S12	120 Winter	100	+20%	1/15	Summer				

PN	US/MH Name	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
		Level (m)	Depth (m)	Volume (m³)			Flow (l/s)		Exceeded
10.000	S5	63.553	0.553	3.176	1.22		17.1	FLOOD	5
10.001	S6	63.499	0.772	0.000	0.96		12.2	FLOOD RISK	
10.002	S7	63.488	0.821	0.000	0.90		12.2	FLOOD RISK	
11.000	S8	63.479	0.579	0.000	0.47		2.7	FLOOD RISK	

