

GWK STRUCTURAL SOLUTIONS LTD **CONSULTING ENGINEERS**

Proposed Drainage Strategy to Discharge Planning Conditions 9 & 10 of Application No. 125555/FO/2019

PROJECT REFERENCE:

- **Project No:** GK2496
- **Project Location:** Land to Rear of 29 Berry Brow, Manchester
- **Project Title:** Berry Brow
- **Client:** Mr G Stelfox

				APPROVALS	
Issue	Date	Pages	Issue Description	By	Check
A	14.01.21		Issued to discharge planning condition	PG	GWK
☒ Entire Report Issued this Revision			Report Issued for:		
☐ Revised Pages Only Issued this Revision			☐ In-house Review	☐ Purchase	☐ Construction
			☐ Client Approval	☐ Construction	☒ Planning
			☐ Inquiry	☒ Planning	

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1.0 Introduction

In February 2020 a planning application was submitted to Manchester City Council for the construction of a single residential property within the rear garden of No. 29 Berry Brow, Manchester. No Flood Risk Assessment or Drainage Strategy Report was submitted with the application.

Planning approval, ref 125555/FO/2020 was granted in August 2020 subject to two planning conditions relating to the drainage of the development.

This report has been prepared to remove these conditions; numbers 9 & 10.

2.0 Drainage Strategy

2.1 Existing Drainage

The United Utilities sewer records have been reviewed and confirm that there is a combined public sewer within Berry Brow highway to the south of the site.

There is also an existing 100mm diameter combined drain within the property of no. 43 Berry Brow that runs along the front of the existing properties and connects to the public sewer.

The site is currently greenfield.

2.2 Existing Geology

A review of the local BGS borehole information would indicate the local ground conditions to incorporate cohesive clay. This would therefore negate the option of infiltration as a viable option for draining the site.

2.3 Existing Watercourse

A review of the local maps would indicate the closest watercourse to be the River Medlock some 100m to the south of the site within 3rd party land.

2.4 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	A review of local BGS ground conditions and would indicate the underlying ground to be clay, thus unsuitable for infiltration.
Connection to Watercourse	No	There are no watercourses in close proximity to the development site.
Connection to Surface Water Sewer	No	There are no surface water sewers in close proximity to the development site.
Connection to Combined Water Sewer	Yes	The combined drain within the neighbouring property to be used

Figure 1: SuDS Hierarchal Approach

2.5 Surface Water Drainage Strategy

The general principal of the surface water drainage strategy is to collect the runoff from the roof configuration of the new residential property and direct it to a number of new RWPs that will drop down to a new surface water network on either side. The rear pipes will pass through a water butt. All flows will merge at a flow control chamber, limited the peak flow to 3l/s. Attenuation measures will take the form of an offline attenuation tank.

2.6 Maintenance

The long-term maintenance of the new drainage infrastructure will be with the owner of the property in line with best practice guidance.

3.0 Drainage Related Planning Condition and Responses

3.1 Planning Conditions

Condition 9.

Prior to any above ground works a surface water drainage layout, based on sustainable drainage principles, shall be submitted for approval in writing by the City Council, as Local Planning Authority. The approved details shall then be implemented and remain in place for as long as the development remains in use.

Condition 10.

Prior to any above ground works, the development shall be carried out in accordance with the following;

- *The site must be drained on a separate system combining just prior to the connection to the public combined sewerage system;*

Details demonstrating the above shall be submitted for approval in writing by the City Council, as Local Planning Authority. The approved details shall then be implemented and remain in place for as long as the development remains in use.

3.2 GWK Response to Discharge Planning Conditions

Condition 9.

Water butts will be incorporated to act as a prevention measure. As described in section 2.0, ground conditions will preclude the use of infiltration as a means of draining the surface water. As such the surface water is proposed to outfall to the adjacent combined drain in No. 43 Berry Brow at a peak rate of 3l/s. All drainage is to be maintained by the property owner.

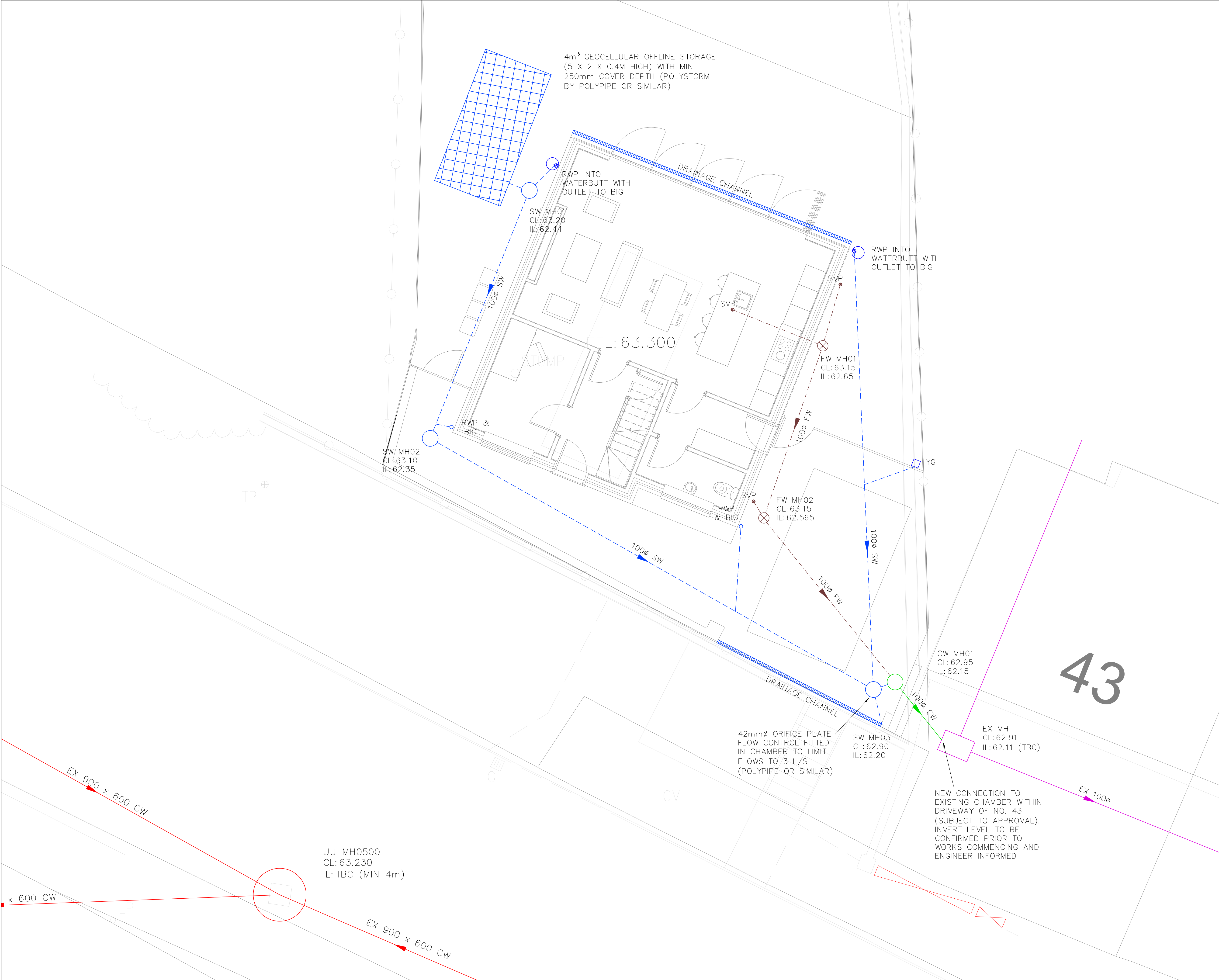
The Outline drainage GA can be found in Appendix A with the calculations in Appendix B.

Foul drainage will connect to the same adjacent combined drain / sewer.

Condition 10.

As shown on the GA drawing in Appendix A, there will be separate foul and surface water networks around the property which will combine at the final outfall location.

Appendix A - GWK Design Drawings



NOTES

NOTES:-

- 1. ALL LEVELS ARE IN METRES.
- 2. ALL DIMENSIONS ARE IN MILLIMETRES.
- 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF ALL DIMENSIONS AND LEVELS AND FOR THE CORRECT SETTING OUT OF THE WORK ON SITE UNLESS NOTED OTHERWISE.
- 4. THE CONTRACTOR SHALL ENSURE ALL NECESSARY PRECAUTIONS ARE TAKEN TO PROTECT EXISTING SERVICES DURING THE WORKS.

KEY

- EXISTING COMBINED WATER SEWER
- EXISTING COMBINED WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED COMBINED WATER DRAINAGE
- PROPOSED 450ø PPIC
- PROPOSED 300ø MINI PPIC (MAX 600 DP)
- RWP RAINWATER PIPE
- SVP SOIL VENT PIPE
- RG ROAD GULLY
- YG YARD GULLY
- RE RODDING EYE

NOTE ALL RWP AND SVP LOCATIONS TO BE CONFIRMED BY OTHERS

FFL & EXTERNAL LEVELS TO BE CONFIRMED BY OTHERS

ALL PIPEWORK TO BE 100ø UNLESS NOTED OTHERWISE

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No	DATE	DRAWN	REV'D ENG.	AMENDMENT



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CLIENT	MR G STELFOX						
PROJECT	LAND TO REAR OF 29 BERRY BROW, MANCHESTER						
DRAFTER	PG		ENGINEER	GWK			
TITLE	DRAINAGE GA						
SCALE	1:50	DRAWING No	GK2496-C-001	DATE	12.01.21	AMDT	A

Appendix B - GWK Drainage Calculations

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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	0.355	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

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.020	4-8	0.002

Total Area Contributing (ha) = 0.022

Total Pipe Volume (m³) = 0.314

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
1.000	1.000	0.010	100.0	0.000	4.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	9.000	0.090	100.0	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	15.000	0.150	100.0	0.002	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	13.000	0.240	54.2	0.006	4.00	0.0	0.600	o	100	Pipe/Conduit	
1.003	2.000	0.020	100.0	0.006	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.02	62.450	0.000	0.0	0.0	0.0	0.77	6.0	0.0
1.001	50.00	4.22	62.440	0.008	0.0	0.0	0.0	0.77	6.0	1.1
1.002	50.00	4.54	62.350	0.010	0.0	0.0	0.0	0.77	6.0	1.4
2.000	50.00	4.21	62.450	0.006	0.0	0.0	0.0	1.05	8.2	0.8
1.003	50.00	4.59	62.200	0.022	0.0	0.0	0.0	0.77	6.0	3.0

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	TANK	63.200	62.450	0.650	Open Manhole	0
1.001	o	100	S1	63.150	62.440	0.610	Open Manhole	450
1.002	o	100	S2	63.100	62.350	0.650	Open Manhole	450
2.000	o	100	RE	63.150	62.450	0.600	Open Manhole	150
1.003	o	100	S3	62.900	62.200	0.600	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	1.000	100.0	S1	63.150	62.440	0.610	Open Manhole	450
1.001	9.000	100.0	S2	63.100	62.350	0.650	Open Manhole	450
1.002	15.000	100.0	S3	62.900	62.200	0.600	Open Manhole	450
2.000	13.000	54.2	S3	62.900	62.210	0.590	Open Manhole	450
1.003	2.000	100.0	SEWER	62.900	62.180	0.620	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	SEWER	62.900	62.180	62.100	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 * 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.355		

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Online Controls for Storm

Orifice Manhole: S3, DS/PN: 1.003, Volume (m³): 0.3

Diameter (m) 0.042 Discharge Coefficient 0.600 Invert Level (m) 62.200

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Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 1.000

Invert Level (m) 62.450 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	10.0	10.0	1.800	0.0	15.1	3.600	0.0	15.1
0.200	10.0	12.5	2.000	0.0	15.1	3.800	0.0	15.1
0.400	10.0	15.1	2.200	0.0	15.1	4.000	0.0	15.1
0.401	0.0	15.1	2.400	0.0	15.1	4.200	0.0	15.1
0.800	0.0	15.1	2.600	0.0	15.1	4.400	0.0	15.1
1.000	0.0	15.1	2.800	0.0	15.1	4.600	0.0	15.1
1.200	0.0	15.1	3.000	0.0	15.1	4.800	0.0	15.1
1.400	0.0	15.1	3.200	0.0	15.1	5.000	0.0	15.1
1.600	0.0	15.1	3.400	0.0	15.1			

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.355 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, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m ³)
1.000	TANK	15 Winter	1	+0%	30/15 Winter				62.451	-0.099	0.000
1.001	S1	15 Winter	1	+0%	30/15 Summer				62.465	-0.075	0.000
1.002	S2	15 Winter	1	+0%	30/15 Summer				62.437	-0.013	0.000
2.000	RE	15 Winter	1	+0%	30/15 Summer				62.471	-0.079	0.000
1.003	S3	15 Winter	1	+0%	1/15 Summer				62.429	0.129	0.000

PN	US/MH		Flow / Overflow		Pipe Flow (l/s)	Status	Level Exceeded
	Name	Cap.	(l/s)	(l/s)			
1.000	TANK	0.00		0.0	OK		
1.001	S1	0.14		0.8	OK		
1.002	S2	0.15		0.9	OK		
2.000	RE	0.10		0.8	OK		
1.003	S3	0.43		1.7	SURCHARGED		

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.355 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, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m ³)
1.000	TANK	15 Winter	30	+0%	30/15 Winter				62.550	0.000	0.000
1.001	S1	15 Summer	30	+0%	30/15 Summer				62.591	0.051	0.000
1.002	S2	15 Summer	30	+0%	30/15 Summer				62.642	0.192	0.000
2.000	RE	15 Summer	30	+0%	30/15 Summer				62.700	0.150	0.000
1.003	S3	15 Summer	30	+0%	1/15 Summer				62.680	0.380	0.000

PN	US/MH		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level
	Name						Exceeded
1.000	TANK		0.40		1.6	SURCHARGED	
1.001	S1		0.29		1.6	SURCHARGED	
1.002	S2		0.29		1.7	SURCHARGED	
2.000	RE		0.24		1.9	SURCHARGED	
1.003	S3		0.63		2.5	FLOOD RISK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.355 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, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m ³)
1.000	TANK	30 Winter	100	+40%	30/15 Winter				62.742	0.192	0.000
1.001	S1	30 Winter	100	+40%	30/15 Summer				62.749	0.209	0.000
1.002	S2	15 Winter	100	+40%	30/15 Summer				62.797	0.347	0.000
2.000	RE	15 Winter	100	+40%	30/15 Summer				62.922	0.372	0.000
1.003	S3	15 Winter	100	+40%	1/15 Summer				62.880	0.580	0.000

PN	US/MH Name	Pipe Flow / Overflow		Pipe Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	TANK	0.54		2.1	SURCHARGED	
1.001	S1	0.40		2.2	SURCHARGED	
1.002	S2	0.39		2.2	SURCHARGED	
2.000	RE	0.43		3.3	FLOOD RISK	
1.003	S3	0.75		3.0	FLOOD RISK	