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The Ridge,
Haverhill Business Park

Plots SE2, NE1 and NE2
SW DRAINAGE STRATEGY

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APPENDICES

1.0 Introduction

The Drainage Strategy has been prepared in support of a Reserved Matters planning application at Haverhill Business Park.

The site currently has outline consent DC/15/2424/OUT for an industrial development. The Drainage Assessment for the Outline Application was described in Baynham Meikle Partnership report NSB/12070/FRA Dated 26th November 2015, which identified discharge rates and outfall locations to the local Anglian Water Adopted SW sewer network.

This Drainage Strategy cover the proposed drainage for Plots SE2, NE1 and NE2

In the preparation of this document, reference has been made to Suffolk Flood Risk Management Partnership document Sustainable Drainage Systems (SuDS) a Local Design Guide to determine allowable discharge rates.

2.0 Site Context

2.1 Site Location.

The site comprised 2 development plots north and south of Iceni Way, Haverhill at Grid Reference TL67844424. The sites are shown in Figure 1.

Figure 1 - SIte Boundary

Reference should be made to the Ground Investigation Report for historical and current land use.

In summary, the site forms part of a wider business park development. Development Plots SE2 and NE1/NE2 have been subject to previous earthworks and remediation. The site is now characterized by generally level plateaued

ground with freshly exposed clayey soils at surface. Steep slopes bound the NE1/2 site to the north and west.

The NE1/NE2 site is bounded to the north by an ecological area, and the east by dense vegetation and footpath. To the west is Bumpstead Road with Iceni Way to the South.

SE2 plot is bounded to the north by Iceni Way, the west and east by previous phases of development and to the south by A1017 Haverhill Bypass.

2.2 Site Geology/ Hydrogeology

Reference should be made to the geo-environmental reports for details of the site geology.

In summary, the site comprises reworked natural fill comprising firm to stiff brown clays with varying degrees of sands and gravels. This is underlain by a natural strata of the Lowestoft Formation, a firm to stiff brown clay with varying degrees of sands and gravels, below which is the Lewes Nodular Chalk formation of the Seaford Nodular Chalk formation.

In terms of Groundwater Vulnerability, the underlying bedrock geology strata is classed as a 'Principal Aquifer'.

The overlying Superficial Deposits is classed as Secondary A/ Secondary (undifferentiated).

The NE1/2 site is not within a Source Protection Zone. The SE2 site is in Groundwater Source Protection Zone 3.

3.0 Impermeable Area

Figure 2 shows the development proposals, with a total site area of 5.6Ha. The site current has no impermeable area.

Figure 2 - Site Plan

4.0 Drainage Strategy

4.1 Hierarchy of Disposal

Generally the aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable.

- Into the ground (infiltration).
- To a surface water body.
- To a surface water sewer, highway drain, or other drainage system.
- To a combined sewer.

Infiltration

As assessment of the potential suitability of the prevailing ground conditions for constructing soakaways to deal with surface water drainage has not been carried out to date. However, the described CLAY soils are likely to be encountered to significant depth.

The ground conditions would therefore suggest that soakaways are not a suitable option for dealing with surface water drainage.

Water Body

There are no accessible water bodies running through or adjacent to the site. However the network of Anglian Water surface water sewers running in Iceni Way and Bumpstead road discharges to a balancing pond in the ecological are to the north of the NE1/NE2 site.

Surface Water Sewer/Combined Sewer

Surface water sewers run along Iceni Way and Bumpstead Road.

Anglain Water have previously consented to the discharge of surface water from these development plots into the sewer network as part of the outline consent for the development of the business park. A developer enquiry will be made to confirm the proposed discharge rates presented in this report, which are lower than previously agreed.

Current proposals are therefore to connect to public sewers in Iceni Way and Bumpstead Road subject to a Section 106 application for connection.

4.2 Climate Change

The site will need to consider the potential future impacts of climate change on peak rainfall intensity to understand the effects of discharge from the site. The site drainage will therefore be designed in accordance with accommodate the 1 in 100 year event + climate change. The network has been modelled for the 100yr return period with a climate change allowance of 20%. The sensitivity of a 40% climate change allowance has also been assessed.

4.3 Discharge Rates

In accordance with Section 5 of the Suffolk Surface Water Drainage (SuDS) Guidance discharge rates from the site will be limited to Qbar or 2 l/s / Ha whichever is higher for all return periods up to the critical 100yr +CC.

Qbar calculations using ICP SuDS are included at Appendix A and summarized in Table 1.

Site SE2 Qbar (l/s)	3.0
Site NE1/2 Qbar (l/s)	13.1

Table 1 - Qbar Rates

Ordinarily, discharge rates less the 5l/s would be set at 5 l/s to minimize the risk of blockages. However, as part of the Reserved Matters application and consent for the Builders Merchant on the adjacent Plot SE1, Anglian Water have previously accepted a combined discharge rate of 7 l/s for SE1 and SE2. SE1 discharges 3.5 l/s with 3.5l /s reserved fro plot SE2. It is therefore proposed to discharge surface water from SE at 3.5 l/s.

Plots NE1 and NE2 generally sit at 2 separate plateau levels. Each site therefore will have a separate flow control device with each unit having their own attenuation storage. The final outfall will be control by a Hydrobrake at 13.1l/s

4.4 Drainage Network

A preliminary drainage layout is shown on drawing 2018-294-101 P1 (Appendix B).

The 2 SW drainage networks hav been designed in accordance with the design principles in Section 5 of the Suffolk Surface Water Drainage (SuDS) Guidance, i.e.

- Not increase flood risk off site (in all events up to 100 year return period);
- No flooding inside buildings in events up to a 100 year return period and no flooding in other areas (apart from designated flood paths /storage areas) in events up to 30 year return period

The principles of the design are to ensure that below ground attenuation tanks will store all surface water up to the 30 year return period. The loading docks will be utilized to temporarily contain water in excess of the 30 year return period with no flooding other than in the loading docks up to the 1 in 100 year return period.

Microdrainage Network Details and Simulation results are included at Appendix C1 and C2

For the SE2 plot, the results demonstrate

- No flooding for the 30 year return period.
- Negligible flooding for the 100 year return period within the porous paving
- For the 100 year return period plus 20% climate change there is 7m3 flooding at MH 14. Overland flow routing directs this away from the building and into the low point of Iceni Way. There will be sufficient capacity to contain this volume of water without risk to buildings. Additional Flooding at MH 10/11 (porous paving) will be contained within the car park

- For the 100 year plus 20% and 40% climate change events the principle flooding occurs near the outfall. Again, this is directed away from buildings to Iceni Way.

For NE1/2 Plots, the loading docks have been modelled as surface ponds and the simulation results demonstrate:

- No flooding for the 30 year return period.
- No Flooding for the 100 year return period with surface water backing up into the loading docks.
- For the 100 return period with 20% and 40% climate change allowances flooding occurs generally across the site. Overland flow routes ensure that this flooding is directed to the car park areas and the additional capacity in loading docks and low points of service yards where it can be temporarily contained before draining back into the system.

5.0 Maintenance of SuDS Features

The maintenance regime of the drainage system, attenuation tank and oil separator will be provided to the end user in the form of Operation and Maintenance Manuals to ensure that the SuDS features continue to operate in the manner intended.

The attenuation tank will be subject to the maintenance schedule detailed in Table 2.

Monthly	Inspect upsteam catchpit for silt. Clean out if necessary using vacuum tanker.
Six monthly	Remove sediment from the inlet catchpit with a vacuum tanker twice a year as necessary, ideally at the start of Spring when general landscaping tidying up is carried out after winter damage and autumn leaf fall.
Annually	Annually inspect/check all sumps, inlets, outlets, vents to tanks to ensure that they are in good condition and operating as designed. Inspect distribution pipe by CCTV and if necessary clean out.
Remediation Inspection & tasks following significant storm events	Inspect upsteam and downstream manholes for silt and debris. Clean out as necessary using vacuum tanker.
Contingency plan details	Exceedance flows as defined in the Drainage Strategy Drawing.

Table 2 - Attenuation Tank Typical Maintenance Schedule

Permeable block paving will be subject to the maintenance schedule detailed in Table 3.

Six monthly	Brushing and vacuuming to manufacturer requirements. Re-grit where necessary after brushing.
Annually	Inspect infiltration surface for excessive siltation.
As Required	After significant storm events inspect / check surface and overflows (where specified) to ensure they are in good condition, free from blockages and operating as designed. Removal of weeds where required. Regularly Remove Leaf Fall in Autumn
Contingency plan details	Exceedance flows as defined in the Drainage Strategy Drawing.

Table 3 – Permeable Paving Typical Maintenance Schedule

Maintenance of the oil separator will be in accordance with the manufacturers details to be incorporated in the Operation and Maintenance Manuals.

At the time of writing, no end user has been identified. Contact details for the person responsible for maintenance will be provided, when known.

6.0 Water Quality

Permeable paving has been used in parking areas to provide initial treatment. Water quality provision in service yards will be proved by class 1 full retention separators.

Both site discharge to the Anglian water surface water sewer network which in turn discharges to an existing balancing pond off site to the north. The final outfall from this pond is unknown.

In accordance with the simple index approach used in the SuDS Manual, the provision of permeable paving and oil separators on site as the initial treatment, together with the existing balancing pond off site ensures that the hazard mitigation index exceeds the hazard risk rating.

A summary of the Risk and Hazard ratings are shown below.

Hazard	Commercial Yard Hazard Index	Full Retention Separator Mitigation	Car Pak Hazard Index	Porous Subbase SuDS Mitigation Index	Balancing Pond
Total suspended solids (TSS)	0.7	-	0.5	0.7	0.7
Metals	0.6	-	0.4	0.6	0.7
Hydrocarbons	0.7		0.4	0.7	0.5

APPENDICES

Appendix A – Greenfield Rates
Appendix B – Drainage Strategy Plan
Appendix C – Microdrainage Calculations
1. Plot SE2
2. Plot NE1/2

Appendix A – Greenfield Rates

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	1.060	Urban	0.000
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	3.0
QBAR Urban	3.0
Q1 year	2.6
Q1 year	2.6
Q30 years	6.8
Q100 years	9.6

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	4.600	Urban	0.000
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	13.1
QBAR Urban	13.1
Q1 year	11.1
Q1 year	11.1
Q30 years	29.6
Q100 years	41.7

Appendix B – Drawings

- 2018-287-102 P1 Proposed Drainage Layout

Saguenay
Balancing Pond
LIONS BUMPSTEAD ROAD
BUMPSTEAD ROAD
PLOT 4000A
Path (um)
Dismantled Railway
Cellular Storage Tank 400m³
Loading Dock Providing Storage > 30 Yr Return Period
Full Retention Interceptor
PLOT 1 IMPERMEABLE AREA 12982 m2
NE1
Cellular Storage Tank 312m³
Flow Control
PLOT 3 IMPERMEABLE AREA 10189 m2
NE2 Flow Control 8.1 l/s
Cellular Storage Tank 320m³
PLOT 2 IMPERMEABLE AREA 10374 m2
Cellular Storage Tank 144m³
PLOT 4 IMPERMEABLE AREA 4106 m2
ICENI WAY
El Sub Sta
Flow Control 3.5 l/s
Cellular Storage tank 450m³
SE1
SE2
PLOT 5 IMPERMEABLE AREA 8575 m2
Ponds
A1017 HAVERHILL BYPASS
A 1017
Lay-by
Drain
LEGEND:
Existing Foul Manhole & Sewer
Existing Surface Water Manhole & Sewer
Proposed Foul Manhole & Sewer
Proposed Surface Water Manhole & Sewer
Bypass Interceptor
Drainage Channel
Gulley
Permeable Paving
Cellular Attenuation Tank
Exceedance Flow Route

NOLAN ASSOCIATES

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

REV	DESCRIPTION	BY	CHKD	DATE
P1	PRELIMINARY	...	KP	03.05.19

The Ridge
Haverhill

Proposed Drainage
General Arrangement

Trebor Developments

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Drawn by	Date	Plot Date	Scale
.	03.05.19	03.05.19	1:500@A0
Checked by KP	Project No 2018-294		Dwg No 101 P1

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Appendix C1 – Plot SE1 Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	20.500	Add Flow / Climate Change (%)	0
Ratio R	0.418	Minimum Backdrop Height (m)	2.000
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	2.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900
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 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
1.000	35.930	0.363	99.0	0.054	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	36.548	0.262	139.6	0.108	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	61.012	0.253	241.6	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	1.715	0.007	241.6	0.212	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	10.784	0.720	15.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	3.819	0.013	289.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	36.198	0.366	99.0	0.054	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	36.757	0.525	70.0	0.108	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)
1.000	100.00	5.59	80.650	0.054	0.0	0.0	0.0	1.01	17.8	14.6
1.001	100.00	6.14	80.212	0.162	0.0	0.0	0.0	1.10	43.9	43.9
1.002	100.00	7.15	79.875	0.216	0.0	0.0	0.0	1.01	71.2	58.5
2.000	100.00	5.03	80.350	0.212	0.0	0.0	0.0	1.01	71.2	57.4
2.001	100.00	5.07	80.343	0.212	0.0	0.0	0.0	4.08	288.6	57.4
1.003	100.00	7.21	79.548	0.428	0.0	0.0	0.0	1.06	117.0	115.9
3.000	100.00	5.60	80.650	0.054	0.0	0.0	0.0	1.01	17.8	14.6
3.001	100.00	5.99	80.209	0.162	0.0	0.0	0.0	1.56	62.2	43.9

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
1.004	9.740	0.029	333.7	0.054	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	1.181	0.023	50.5	0.149	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	2.323	0.023	99.3	0.040	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	5.750	0.024	241.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	30.870	0.068	454.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.000	6.472	0.111	58.5	0.023	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.006	16.849	0.862	19.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.004	100.00	7.36	79.460	0.644	0.0	0.0	0.0	1.11	176.1	174.4
4.000	100.00	5.01	80.150	0.149	0.0	0.0	0.0	1.85	73.4	40.4
5.000	100.00	5.04	80.225	0.040	0.0	0.0	0.0	1.01	17.8	10.8
4.001	100.00	5.13	80.052	0.189	0.0	0.0	0.0	1.01	71.1	51.2
1.005	100.00	7.90	78.600	0.833	0.0	0.0	0.0	0.95	150.7«	225.6
6.000	100.00	5.11	79.300	0.023	0.0	0.0	0.0	1.01	7.9	6.2
1.006	100.00	8.03	78.532	0.856	0.0	0.0	0.0	2.29	40.4«	231.8

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006	16	79.780	77.670	76.880	1200	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 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	3
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)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.500	Storm Duration (mins)	30
Ratio R	0.418		

Online Controls for Storm

Complex Manhole: 12, DS/PN: 4.001, Volume (m³): 1.5

Orifice

Diameter (m) 0.042 Discharge Coefficient 0.600 Invert Level (m) 80.052

Weir

Discharge Coef 0.544 Width (m) 1.200 Invert Level (m) 81.232

Hydro-Brake® Optimum Manhole: 15, DS/PN: 1.006, Volume (m³): 9.3

Unit Reference	MD-SHE-0084-3500-1300-3500
Design Head (m)	1.300
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	84
Invert Level (m)	78.532
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	3.5
Flush-Flo™	0.368	3.4
Kick-Flo®	0.751	2.7
Mean Flow over Head Range	-	3.0

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	2.5	1.200	3.4	3.000	5.1	7.000	7.7
0.200	3.2	1.400	3.6	3.500	5.5	7.500	7.9
0.300	3.4	1.600	3.8	4.000	5.9	8.000	8.2
0.400	3.4	1.800	4.1	4.500	6.2	8.500	8.4
0.500	3.3	2.000	4.3	5.000	6.5	9.000	8.7
0.600	3.2	2.200	4.5	5.500	6.8	9.500	8.9
0.800	2.8	2.400	4.6	6.000	7.1		
1.000	3.1	2.600	4.8	6.500	7.4		

Storage Structures for Storm

Porous Car Park Manhole: 10, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	69.6
Max Percolation (l/s)	92.8	Slope (1:X)	2000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.815	Membrane Depth (mm)	160

Porous Car Park Manhole: 11, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	16.8
Max Percolation (l/s)	22.4	Slope (1:X)	2000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.815	Membrane Depth (mm)	160

Cellular Storage Manhole: 15, DS/PN: 1.006

Invert Level (m)	78.700	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	280.0	280.0	1.601	0.0	387.1
1.600	280.0	387.1			

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 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	3
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 0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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, 100
Climate Change (%)	0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
1.001	2	15 Winter	30	+0%	30/15 Summer			
1.002	3	15 Winter	30	+0%	30/15 Summer			
2.000	4	15 Winter	30	+0%	30/15 Summer			
2.001	5	15 Winter	30	+0%				
1.003	6	15 Winter	30	+0%	30/15 Summer			
3.000	7	15 Winter	30	+0%	30/15 Summer			
3.001	8	15 Winter	30	+0%	30/15 Summer			
1.004	9	15 Winter	30	+0%	30/15 Summer			
4.000	10	120 Winter	30	+0%	30/15 Summer	100/30 Winter		
5.000	11	120 Winter	30	+0%	30/15 Summer	100/30 Winter		
4.001	12	120 Winter	30	+0%	30/15 Summer			
1.005	13	600 Winter	30	+0%	30/15 Summer			
6.000	14	600 Winter	30	+0%	30/15 Summer	100/720 Winter		
1.006	15	600 Winter	30	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	81.000	0.200	0.000	0.97		16.7	SURCHARGED	3
1.001	2	80.686	0.249	0.000	1.18		48.8	SURCHARGED	
1.002	3	80.337	0.161	0.000	0.92		62.1	SURCHARGED	
2.000	4	80.722	0.072	0.000	1.37		75.2	SURCHARGED	
2.001	5	80.467	-0.176	0.000	0.35		74.7	OK	
1.003	6	80.104	0.181	0.000	1.64		132.1	SURCHARGED	
3.000	7	80.844	0.044	0.000	1.04		18.0	SURCHARGED	
3.001	8	80.448	0.014	0.000	0.93		54.7	SURCHARGED	
1.004	9	79.990	0.080	0.000	1.73		200.1	SURCHARGED	
4.000	10	81.082	0.707	0.000	0.12		3.7	FLOOD RISK	7
5.000	11	81.081	0.706	0.000	0.09		1.0	FLOOD RISK	7
4.001	12	81.117	0.765	0.000	0.08		3.7	FLOOD RISK	
1.005	13	79.704	0.654	0.000	0.18		23.7	SURCHARGED	
6.000	14	79.702	0.302	0.000	0.10		0.7	SURCHARGED	2
1.006	15	79.702	1.020	0.000	0.09		3.4	SURCHARGED	

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	3
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 0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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 (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+0%	100/15 Summer			
1.001	2	15 Winter	100	+0%	100/15 Summer			
1.002	3	15 Winter	100	+0%	100/15 Summer			
2.000	4	15 Winter	100	+0%	100/15 Summer			
2.001	5	15 Winter	100	+0%				
1.003	6	15 Winter	100	+0%	100/15 Summer			
3.000	7	15 Winter	100	+0%	100/15 Summer			
3.001	8	15 Winter	100	+0%	100/15 Summer			
1.004	9	15 Winter	100	+0%	100/15 Summer			
4.000	10	60 Winter	100	+0%	100/15 Summer	100/60 Winter		
5.000	11	60 Winter	100	+0%	100/15 Summer	100/60 Winter		
4.001	12	60 Winter	100	+0%	100/15 Summer			
1.005	13	720 Winter	100	+0%	100/15 Summer			
6.000	14	720 Winter	100	+0%	100/15 Summer			
1.006	15	720 Winter	100	+0%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	81.537	0.737	0.000	1.24		21.3	FLOOD RISK	
1.001	2	81.139	0.702	0.000	1.40		58.1	SURCHARGED	
1.002	3	80.607	0.432	0.000	1.12		75.9	SURCHARGED	
2.000	4	80.787	0.137	0.000	1.77		97.2	SURCHARGED	
2.001	5	80.487	-0.156	0.000	0.46		97.2	OK	
1.003	6	80.251	0.329	0.000	2.08		166.9	SURCHARGED	
3.000	7	81.239	0.439	0.000	1.27		21.8	SURCHARGED	
3.001	8	80.701	0.267	0.000	1.09		64.2	SURCHARGED	
1.004	9	80.066	0.156	0.000	2.18		252.1	SURCHARGED	
4.000	10	81.275	0.900	0.054	0.51		15.2	FLOOD	1
5.000	11	81.275	0.900	0.034	0.39		4.2	FLOOD	1
4.001	12	81.270	0.919	0.000	0.40		19.4	FLOOD RISK	
1.005	13	80.039	0.989	0.000	0.20		26.1	SURCHARGED	
6.000	14	80.038	0.638	0.000	0.11		0.8	FLOOD RISK	
1.006	15	80.038	1.356	0.000	0.10		3.7	SURCHARGED	

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	3
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	0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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, 100
Climate Change (%)	0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+20%	30/15 Summer	100/15 Summer		
1.001	2	15 Winter	100	+20%	30/15 Summer			
1.002	3	15 Winter	100	+20%	30/15 Summer			
2.000	4	15 Winter	100	+20%	30/15 Summer			
2.001	5	15 Winter	100	+20%				
1.003	6	15 Winter	100	+20%	30/15 Summer			
3.000	7	15 Winter	100	+20%	30/15 Summer			
3.001	8	15 Winter	100	+20%	30/15 Summer			
1.004	9	960 Winter	100	+20%	30/15 Summer			
4.000	10	60 Winter	100	+20%	30/15 Summer	100/30 Winter		
5.000	11	60 Winter	100	+20%	30/15 Summer	100/30 Winter		
4.001	12	60 Winter	100	+20%	30/15 Summer			
1.005	13	960 Winter	100	+20%	30/15 Summer			
6.000	14	960 Winter	100	+20%	30/15 Summer	100/720 Winter		
1.006	15	960 Winter	100	+20%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	81.702	0.902	1.707	1.56		26.8	FLOOD	3
1.001	2	81.531	1.093	0.000	1.56		64.7	FLOOD RISK	
1.002	3	80.874	0.699	0.000	1.29		87.2	SURCHARGED	
2.000	4	80.856	0.206	0.000	2.11		116.1	SURCHARGED	
2.001	5	80.606	-0.037	0.000	0.55		116.2	OK	
1.003	6	80.408	0.485	0.000	2.47		198.7	SURCHARGED	
3.000	7	81.656	0.856	0.000	1.47		25.3	FLOOD RISK	
3.001	8	81.001	0.566	0.000	1.27		74.5	SURCHARGED	
1.004	9	80.342	0.432	0.000	0.19		21.7	SURCHARGED	
4.000	10	81.279	0.904	3.991	0.59		17.5	FLOOD	7
5.000	11	81.276	0.901	1.461	0.76		8.2	FLOOD	7
4.001	12	81.273	0.921	0.000	0.43		21.0	FLOOD RISK	
1.005	13	80.341	1.291	0.000	0.19		25.0	SURCHARGED	
6.000	14	80.308	0.908	7.809	0.39		2.8	FLOOD	2
1.006	15	80.338	1.656	0.000	0.11		4.1	SURCHARGED	

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	3
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 0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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 (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
1.001	2	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
1.002	3	15 Winter	100	+40%	100/15 Summer			
2.000	4	15 Winter	100	+40%	100/15 Summer			
2.001	5	15 Winter	100	+40%	100/15 Summer			
1.003	6	600 Winter	100	+40%	100/15 Summer			
3.000	7	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
3.001	8	15 Winter	100	+40%	100/15 Summer			
1.004	9	600 Winter	100	+40%	100/15 Summer			
4.000	10	60 Winter	100	+40%	100/15 Summer	100/15 Winter		
5.000	11	60 Winter	100	+40%	100/15 Summer	100/15 Winter		
4.001	12	360 Winter	100	+40%	100/15 Summer			
1.005	13	600 Winter	100	+40%	100/15 Summer			
6.000	14	960 Winter	100	+40%	100/15 Summer	100/180 Winter		
1.006	15	600 Winter	100	+40%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	81.705	0.905	5.491	1.83		31.5	FLOOD	4
1.001	2	81.701	1.263	0.526	1.59		66.1	FLOOD	2
1.002	3	81.057	0.881	0.000	1.39		94.1	SURCHARGED	
2.000	4	81.060	0.410	0.000	2.33		128.1	SURCHARGED	
2.001	5	80.798	0.155	0.000	0.60		127.3	SURCHARGED	
1.003	6	80.592	0.669	0.000	0.31		24.6	SURCHARGED	
3.000	7	81.702	0.902	1.723	1.73		29.8	FLOOD	3
3.001	8	81.305	0.871	0.000	1.43		83.9	SURCHARGED	
1.004	9	80.592	0.682	0.000	0.32		36.7	SURCHARGED	
4.000	10	81.284	0.909	9.395	0.68		20.5	FLOOD	17
5.000	11	81.279	0.904	3.898	0.99		10.8	FLOOD	17
4.001	12	81.323	0.972	0.000	0.33		15.9	FLOOD RISK	
1.005	13	80.592	1.542	0.000	0.31		40.4	SURCHARGED	
6.000	14	80.389	0.989	88.739	0.55		3.9	FLOOD	13
1.006	15	80.589	1.907	0.000	0.11		4.3	SURCHARGED	

Nolan Associates
consulting civil and structural engineers

Appendix C2 – Plot NE1/2 Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	20.500	Add Flow / Climate Change (%)	0
Ratio R	0.418	Minimum Backdrop Height (m)	2.000
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	2.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900
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 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
1.000	38.801	0.489	79.3	0.073	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	38.732	0.160	241.6	0.147	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	37.160	0.116	321.4	0.073	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.003	33.566	0.104	321.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	30.290	0.094	321.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.000	43.282	0.546	79.3	0.073	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	31.337	0.130	241.6	0.147	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	5.888	0.188	31.3	0.073	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	16.847	0.264	63.8	0.263	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	100.00	5.57	81.050	0.073	0.0	0.0	0.0	1.13	20.0	19.8
1.001	100.00	6.21	80.411	0.220	0.0	0.0	0.0	1.01	71.2	59.6
1.002	100.00	6.83	80.175	0.293	0.0	0.0	0.0	1.01	111.0	79.4
1.003	100.00	7.39	80.060	0.293	0.0	0.0	0.0	1.01	111.0	79.4
1.004	100.00	7.89	79.955	0.293	0.0	0.0	0.0	1.01	111.0	79.4
2.000	100.00	5.64	80.950	0.073	0.0	0.0	0.0	1.13	20.0	19.8
2.001	100.00	6.16	80.254	0.220	0.0	0.0	0.0	1.01	71.2	59.6
2.002	100.00	6.19	80.124	0.293	0.0	0.0	0.0	2.82	199.5	79.4
3.000	100.00	5.14	80.300	0.263	0.0	0.0	0.0	1.97	139.3	71.2

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
4.000	3.869	0.039	99.2	0.084	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	18.449	0.100	184.6	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	9.911	0.075	131.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.000	1.310	0.016	80.0	0.082	5.00	0.0	0.600	o	100	Pipe/Conduit	
6.000	2.721	0.016	170.1	0.232	5.00	0.0	0.600	o	100	Pipe/Conduit	
5.001	7.136	0.623	11.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	35.093	0.070	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
1.007	9.774	0.020	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
1.008	47.058	0.094	500.0	0.053	0.00	0.0	0.600	o	675	Pipe/Conduit	
1.009	28.738	0.548	52.5	0.033	0.00	0.0	0.600	o	675	Pipe/Conduit	
7.000	1.695	0.021	80.7	0.049	5.00	0.0	0.600	o	100	Pipe/Conduit	
7.001	2.296	0.328	7.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
8.000	15.182	0.063	241.6	0.230	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)
4.000	100.00	5.05	80.150	0.084	0.0	0.0	0.0	1.31	52.2	22.7
3.001	100.00	5.37	79.961	0.347	0.0	0.0	0.0	1.33	146.9	94.0
1.005	100.00	7.98	79.786	0.933	0.0	0.0	0.0	1.77	281.4	252.7
5.000	100.00	5.03	80.700	0.082	0.0	0.0	0.0	0.86	6.8«	22.2
6.000	100.00	5.08	80.700	0.232	0.0	0.0	0.0	0.59	4.6«	62.8
5.001	100.00	5.11	80.559	0.314	0.0	0.0	0.0	3.89	154.6	85.0
1.006	100.00	8.48	79.486	1.247	0.0	0.0	0.0	1.17	417.0	337.7
1.007	100.00	8.62	79.416	1.247	0.0	0.0	0.0	1.17	417.0	337.7
1.008	100.00	9.30	79.396	1.300	0.0	0.0	0.0	1.17	417.0	352.1
1.009	100.00	9.43	79.302	1.333	0.0	0.0	0.0	3.62	1296.7	361.0
7.000	100.00	5.03	80.700	0.049	0.0	0.0	0.0	0.86	6.7«	13.3
7.001	100.00	5.05	80.679	0.049	0.0	0.0	0.0	2.94	23.1	13.3
8.000	100.00	5.25	80.300	0.230	0.0	0.0	0.0	1.01	71.2	62.3

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
9.000	11.365	0.313	36.3	0.024	5.00	0.0	0.600	o	100	Pipe/Conduit	
8.001	7.808	0.086	90.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	2.989	0.696	4.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.000	28.361	0.286	99.2	0.050	5.00	0.0	0.600	o	150	Pipe/Conduit	
10.001	28.361	0.176	160.8	0.100	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.002	56.697	0.722	78.5	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
11.000	6.779	0.116	58.5	0.000	5.00	0.0	0.600	o	100	Pipe/Conduit	
11.001	31.059	0.564	55.1	0.050	0.00	0.0	0.600	o	150	Pipe/Conduit	
12.000	10.910	0.680	16.0	0.151	5.00	0.0	0.600	o	100	Pipe/Conduit	
11.002	29.534	0.092	321.4	0.100	0.00	0.0	0.600	o	375	Pipe/Conduit	
11.003	20.130	0.063	321.4	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.003	8.447	0.261	32.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.003	26.825	0.063	425.9	0.000	0.00	0.0	0.600	o	525	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)
9.000	100.00	5.15	80.750	0.024	0.0	0.0	0.0	1.28	10.1	6.5
8.001	100.00	5.33	80.237	0.254	0.0	0.0	0.0	1.65	116.8	68.8
7.002	100.00	5.34	80.151	0.303	0.0	0.0	0.0	7.64	539.9	82.1
10.000	100.00	5.47	81.050	0.050	0.0	0.0	0.0	1.01	17.8	13.5
10.001	100.00	5.93	80.689	0.150	0.0	0.0	0.0	1.03	40.9	40.6
10.002	100.00	6.57	80.513	0.200	0.0	0.0	0.0	1.48	58.7	54.2
11.000	100.00	5.11	80.750	0.000	0.0	0.0	0.0	1.01	7.9	0.0
11.001	100.00	5.49	80.584	0.050	0.0	0.0	0.0	1.36	24.0	13.5
12.000	100.00	5.09	80.750	0.151	0.0	0.0	0.0	1.94	15.2«	40.9
11.002	100.00	5.98	79.795	0.301	0.0	0.0	0.0	1.01	111.0	81.5
11.003	100.00	6.32	79.703	0.351	0.0	0.0	0.0	1.01	111.0	95.1
10.003	100.00	6.61	79.640	0.551	0.0	0.0	0.0	3.19	352.8	149.2
7.003	100.00	7.03	79.230	0.854	0.0	0.0	0.0	1.08	233.6	231.3

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
7.004	12.038	0.262	45.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.010	32.621	0.065	500.0	0.037	0.00	0.0	0.600	o	825	Pipe/Conduit	
13.000	33.919	0.428	79.2	0.073	5.00	0.0	0.600	o	150	Pipe/Conduit	
13.001	33.778	1.408	24.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.011	23.327	0.713	32.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
14.000	41.456	0.417	99.4	0.033	5.00	0.0	0.600	o	150	Pipe/Conduit	
15.000	14.738	0.167	88.3	0.169	5.00	0.0	0.600	o	225	Pipe/Conduit	
16.000	9.014	0.267	33.8	0.051	5.00	0.0	0.600	o	150	Pipe/Conduit	
14.001	14.200	0.500	28.4	0.033	0.00	0.0	0.600	o	225	Pipe/Conduit	
17.000	42.938	0.432	99.4	0.033	5.00	0.0	0.600	o	150	Pipe/Conduit	
17.001	23.267	0.485	48.0	0.033	0.00	0.0	0.600	o	150	Pipe/Conduit	
18.000	2.330	0.717	3.3	0.057	5.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.004	100.00	7.09	79.167	0.854	0.0	0.0	0.0	3.31	717.2	231.3
1.010	100.00	9.84	78.604	2.224	0.0	0.0	0.0	1.32	706.1	602.3
13.000	100.00	5.50	81.050	0.073	0.0	0.0	0.0	1.13	20.0	19.8
13.001	100.00	5.77	80.622	0.073	0.0	0.0	0.0	2.06	36.5	19.8
1.011	98.97	10.06	78.539	2.297	0.0	0.0	0.0	1.77	31.2«	615.7
14.000	100.00	5.69	78.850	0.033	0.0	0.0	0.0	1.01	17.8	8.9
15.000	100.00	5.18	78.525	0.169	0.0	0.0	0.0	1.39	55.3	45.8
16.000	100.00	5.09	78.700	0.051	0.0	0.0	0.0	1.74	30.7	13.8
14.001	100.00	5.78	78.358	0.286	0.0	0.0	0.0	2.46	98.0	77.5
17.000	100.00	5.71	78.850	0.033	0.0	0.0	0.0	1.01	17.8	8.9
17.001	100.00	5.98	78.418	0.066	0.0	0.0	0.0	1.46	25.7	17.9
18.000	100.00	5.01	78.700	0.057	0.0	0.0	0.0	4.32	33.9	15.4

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
14.002	13.944	0.044	320.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
14.003	20.475	0.064	320.5	0.027	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	26.197	0.182	143.9	0.046	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.013	63.735	0.443	143.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
19.000	35.602	0.359	99.2	0.059	5.00	0.0	0.600	o	150	Pipe/Conduit	
19.001	35.602	0.147	241.9	0.117	0.00	0.0	0.600	o	300	Pipe/Conduit	
19.002	36.054	0.913	39.5	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
20.000	18.930	0.191	99.1	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit	
20.001	5.770	0.328	17.6	0.233	0.00	0.0	0.600	o	225	Pipe/Conduit	
19.003	5.049	0.171	29.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
21.000	37.788	0.431	87.6	0.059	5.00	0.0	0.600	o	150	Pipe/Conduit	
22.000	1.030	0.013	79.2	0.064	5.00	0.0	0.600	o	100	Pipe/Conduit	
22.001	14.070	0.318	44.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
21.001	21.913	0.099	220.7	0.117	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)
14.002	100.00	6.21	77.708	0.409	0.0	0.0	0.0	1.01	111.2	110.8
14.003	100.00	6.55	77.665	0.436	0.0	0.0	0.0	1.01	111.2«	118.1
1.012	97.87	10.28	77.376	2.779	0.0	0.0	0.0	2.03	573.3«	736.6
1.013	95.31	10.80	77.194	2.779	0.0	0.0	0.0	2.03	573.5«	736.6
19.000	100.00	5.59	78.850	0.059	0.0	0.0	0.0	1.01	17.8	16.0
19.001	100.00	6.18	78.341	0.176	0.0	0.0	0.0	1.01	71.1	47.7
19.002	100.00	6.42	78.194	0.235	0.0	0.0	0.0	2.51	177.4	63.6
20.000	100.00	5.31	77.950	0.052	0.0	0.0	0.0	1.01	17.8	14.1
20.001	100.00	5.34	77.684	0.285	0.0	0.0	0.0	3.14	124.7	77.2
19.003	100.00	6.45	77.281	0.520	0.0	0.0	0.0	2.91	205.4	140.8
21.000	100.00	5.59	78.850	0.059	0.0	0.0	0.0	1.07	19.0	16.0
22.000	100.00	5.02	78.800	0.064	0.0	0.0	0.0	0.87	6.8«	17.3
22.001	100.00	5.17	78.737	0.064	0.0	0.0	0.0	1.52	26.8	17.3
21.001	100.00	5.93	78.269	0.240	0.0	0.0	0.0	1.05	74.5	65.0

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
23.000	0.979	0.014	68.0	0.128	5.00	0.0	0.600	o	100	Pipe/Conduit	
23.001	0.931	0.416	2.2	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
21.002	16.346	0.051	321.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
21.003	30.016	0.103	290.1	0.059	0.00	0.0	0.600	o	375	Pipe/Conduit	
21.004	26.410	0.906	29.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
19.004	23.362	0.047	500.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
19.005	5.945	0.012	500.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.014	19.685	5.080	3.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
23.000	100.00	5.02	78.800	0.128	0.0	0.0	0.0	0.93	7.3«	34.7
23.001	100.00	5.02	78.786	0.128	0.0	0.0	0.0	5.21	40.9	34.7
21.002	100.00	6.20	78.095	0.368	0.0	0.0	0.0	1.01	111.1	99.7
21.003	100.00	6.68	78.044	0.427	0.0	0.0	0.0	1.06	116.9	115.6
21.004	100.00	6.81	77.940	0.427	0.0	0.0	0.0	3.37	371.8	115.6
19.004	100.00	7.17	76.810	0.947	0.0	0.0	0.0	1.08	306.0	256.5
19.005	100.00	7.26	76.763	0.947	0.0	0.0	0.0	1.08	306.0	256.5
1.014	95.18	10.83	76.751	3.726	0.0	0.0	0.0	12.42	3512.9	960.5

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)
1.014	70	73.330	71.671	0.000	1200	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 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	14
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)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.500	Storm Duration (mins)	30
Ratio R	0.418		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 57, DS/PN: 1.011, Volume (m³): 26.1

Unit Reference	MD-SCL-0108-8100-2400-8100
Design Head (m)	2.400
Design Flow (l/s)	8.1
Flush-Flo™	Calculated
Objective	Minimise blockage risk
Application	Surface
Sump Available	Yes
Diameter (mm)	108
Invert Level (m)	78.539
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.400	8.1
Flush-Flo™	0.427	7.1
Kick-Flo®	0.962	5.3
Mean Flow over Head Range	-	6.5

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	4.1	1.200	5.9	3.000	9.0	7.000	13.4
0.200	6.4	1.400	6.3	3.500	9.7	7.500	13.9
0.300	6.9	1.600	6.7	4.000	10.3	8.000	14.3
0.400	7.1	1.800	7.1	4.500	10.9	8.500	14.7
0.500	7.1	2.000	7.4	5.000	11.4	9.000	15.1
0.600	6.9	2.200	7.8	5.500	12.0	9.500	15.5
0.800	6.4	2.400	8.1	6.000	12.5		
1.000	5.4	2.600	8.4	6.500	13.0		

Hydro-Brake® Optimum Manhole: 69, DS/PN: 1.014, Volume (m³): 24.3

Unit Reference	MD-SHE-0144-1310-2400-1310
Design Head (m)	2.400
Design Flow (l/s)	13.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	144
Invert Level (m)	76.751
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Hydro-Brake® Optimum Manhole: 69, DS/PN: 1.014, Volume (m³): 24.3

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.400	13.1
Flush-Flo™	0.622	12.4
Kick-Flo®	1.283	9.7
Mean Flow over Head Range	-	11.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	10.6	3.000	14.6	7.000	21.8
0.200	10.1	1.400	10.2	3.500	15.7	7.500	22.6
0.300	11.3	1.600	10.8	4.000	16.7	8.000	23.3
0.400	12.0	1.800	11.4	4.500	17.7	8.500	24.0
0.500	12.3	2.000	12.0	5.000	18.6	9.000	24.6
0.600	12.4	2.200	12.6	5.500	19.4	9.500	25.3
0.800	12.2	2.400	13.1	6.000	20.3		
1.000	11.7	2.600	13.6	6.500	21.1		

Storage Structures for Storm

Tank or Pond Manhole: 27, DS/PN: 4.000

Invert Level (m) 80.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	0.0	0.073	346.4	0.094	417.9	0.686	815.1

Porous Car Park Manhole: 30, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	43.2
Max Percolation (l/s)	57.6	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.320	Membrane Depth (mm)	130

Porous Car Park Manhole: 31, DS/PN: 6.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.6
Membrane Percolation (mm/hr)	1000	Length (m)	55.2
Max Percolation (l/s)	147.2	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.320	Membrane Depth (mm)	130

Cellular Storage Manhole: 34, DS/PN: 1.007

Invert Level (m)	79.500	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	333.0	333.0	1.201	0.0	420.6
1.200	333.0	420.6			

Porous Car Park Manhole: 37, DS/PN: 7.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.4
Membrane Percolation (mm/hr)	1000	Length (m)	22.8
Max Percolation (l/s)	34.2	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.320	Membrane Depth (mm)	130

Porous Car Park Manhole: 46, DS/PN: 11.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	24.2
Max Percolation (l/s)	32.3	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.320	Membrane Depth (mm)	130

Porous Car Park Manhole: 48, DS/PN: 12.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	34.8
Membrane Percolation (mm/hr)	1000	Length (m)	9.6
Max Percolation (l/s)	92.8	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.320	Membrane Depth (mm)	130

Cellular Storage Manhole: 53, DS/PN: 7.004

Invert Level (m)	79.500	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	266.0	266.0	1.201	0.0	344.3
1.200	266.0	344.3			

Porous Car Park Manhole: 64, DS/PN: 18.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	33.6
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	44.8	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	79.270	Membrane Depth (mm)	130

Cellular Storage Manhole: 66, DS/PN: 14.003

Invert Level (m)	77.700	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	180.0	180.0	0.801	0.0	223.0
0.800	180.0	222.9			

Tank or Pond Manhole: 4, DS/PN: 20.000

Invert Level (m) 78.700

Tank or Pond Manhole: 4, DS/PN: 20.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	0.0	0.073	216.6	0.094	260.1	0.686	507.3

Porous Car Park Manhole: 8, DS/PN: 22.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.6
Membrane Percolation (mm/hr)	1000	Length (m)	20.4
Max Percolation (l/s)	54.4	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	79.370	Membrane Depth (mm)	130

Porous Car Park Manhole: 11, DS/PN: 23.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	74.4
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	99.2	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	79.370	Membrane Depth (mm)	130

Cellular Storage Manhole: 17, DS/PN: 19.005

Invert Level (m)	76.900	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	260.0	260.0	1.201	0.0	337.4
1.200	260.0	337.4			

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 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	14
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 0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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)	1, 30, 100
Climate Change (%)	0, 0, 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	18	15 Winter	1	+0%	30/15 Summer				81.130
1.001	19	15 Winter	1	+0%	30/15 Summer				80.549
1.002	20	15 Winter	1	+0%	30/15 Winter				80.332
1.003	21	15 Winter	1	+0%	30/15 Summer				80.215
1.004	22	15 Winter	1	+0%	30/15 Summer				80.116
2.000	23	15 Winter	1	+0%	30/15 Summer				81.030
2.001	24	15 Winter	1	+0%	30/15 Summer				80.394
2.002	25	15 Winter	1	+0%	30/15 Summer				80.245
3.000	26	15 Winter	1	+0%	30/360 Winter				80.417
4.000	27	15 Winter	1	+0%	30/15 Summer				80.250
3.001	28	15 Winter	1	+0%	30/15 Summer				80.130
1.005	29	15 Winter	1	+0%	30/15 Summer				80.050
5.000	30	15 Winter	1	+0%	1/15 Summer				80.943
6.000	31	15 Winter	1	+0%	1/15 Summer				81.327
5.001	32	15 Winter	1	+0%	100/120 Winter				80.640
1.006	33	240 Winter	1	+0%	30/30 Winter				79.828
1.007	34	240 Winter	1	+0%	30/30 Winter				79.827

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	18	-0.070	0.000	0.55		10.6	OK	
1.001	19	-0.162	0.000	0.42		27.9	OK	
1.002	20	-0.218	0.000	0.36		36.1	OK	
1.003	21	-0.220	0.000	0.36		35.3	OK	
1.004	22	-0.214	0.000	0.36		35.6	OK	
2.000	23	-0.070	0.000	0.55		10.6	OK	
2.001	24	-0.161	0.000	0.43		28.2	OK	
2.002	25	-0.179	0.000	0.34		36.7	OK	
3.000	26	-0.183	0.000	0.32		37.9	OK	
4.000	27	-0.125	0.000	0.40		12.1	OK	
3.001	28	-0.206	0.000	0.41		49.8	OK	
1.005	29	-0.186	0.000	0.65		109.8	OK	
5.000	30	0.143	0.000	2.83		11.1	SURCHARGED	
6.000	31	0.527	0.000	5.24		20.6	SURCHARGED	
5.001	32	-0.143	0.000	0.28		31.6	OK	
1.006	33	-0.333	0.000	0.11		36.0	OK	
1.007	34	-0.264	0.000	0.46		90.5	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.008	35	480 Winter	1	+0%	1/120 Winter				80.547
1.009	36	240 Winter	1	+0%	1/60 Winter				80.551
7.000	37	15 Winter	1	+0%	1/15 Summer				80.841
7.001	38	15 Winter	1	+0%	100/15 Summer				80.726
8.000	39	15 Winter	1	+0%	30/15 Summer				80.461
9.000	40	15 Winter	1	+0%	100/15 Summer				80.792
8.001	41	15 Winter	1	+0%	30/15 Summer				80.388
7.002	42	15 Winter	1	+0%	30/120 Winter				80.244
10.000	43	15 Winter	1	+0%	30/15 Summer				81.119
10.001	44	15 Winter	1	+0%	30/15 Summer				80.803
10.002	45	15 Winter	1	+0%	30/15 Summer				80.618
11.000	46	360 Winter	1	+0%	100/120 Winter				80.750
11.001	47	15 Winter	1	+0%	100/15 Summer				80.637
12.000	48	15 Winter	1	+0%	1/15 Summer				81.089
11.002	49	240 Winter	1	+0%	30/30 Winter				79.996
11.003	50	240 Winter	1	+0%	30/15 Winter				79.995
10.003	51	240 Winter	1	+0%	30/15 Summer				79.999
7.003	52	240 Winter	1	+0%	1/30 Summer				80.011
7.004	53	240 Winter	1	+0%	1/15 Winter				80.012
1.010	54	480 Winter	1	+0%	1/15 Summer				80.871
13.000	55	15 Winter	1	+0%	30/15 Summer				81.130
13.001	56	480 Winter	1	+0%	30/15 Winter				80.766
1.011	57	360 Winter	1	+0%	1/15 Summer				81.154
14.000	58	15 Winter	1	+0%	100/15 Summer				78.904
15.000	59	15 Winter	1	+0%	30/15 Summer				78.639
16.000	60	15 Winter	1	+0%	100/15 Summer				78.754
14.001	61	15 Winter	1	+0%	30/15 Summer				78.468
17.000	62	15 Winter	1	+0%	100/15 Winter				78.904
17.001	63	15 Winter	1	+0%	100/15 Summer				78.480
18.000	64	15 Winter	1	+0%	100/15 Summer				78.741
14.002	65	15 Winter	1	+0%	30/15 Summer				77.935
14.003	66	30 Winter	1	+0%	30/120 Winter				77.801
1.012	67	180 Winter	1	+0%	30/60 Winter				77.681
1.013	68	360 Winter	1	+0%	30/30 Winter				77.485
19.000	1	15 Winter	1	+0%	30/15 Summer				78.925
19.001	2	15 Winter	1	+0%	100/15 Summer				78.463
19.002	3	15 Winter	1	+0%	30/480 Winter				78.280
20.000	4	15 Winter	1	+0%	30/15 Summer				78.021
20.001	5	15 Winter	1	+0%	30/15 Summer				77.790
19.003	6	360 Winter	1	+0%	30/15 Summer				77.466
21.000	7	15 Winter	1	+0%	30/15 Summer				78.922
22.000	8	15 Winter	1	+0%	1/15 Summer				78.988
22.001	9	15 Winter	1	+0%	100/15 Summer				78.799
21.001	10	15 Winter	1	+0%	30/15 Summer				78.415
23.000	11	15 Winter	1	+0%	1/15 Summer				79.194
23.001	12	15 Winter	1	+0%	30/15 Summer				78.857
21.002	13	15 Winter	1	+0%	30/15 Summer				78.285
21.003	14	15 Winter	1	+0%	30/15 Summer				78.233

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.008	35	0.476	0.000	0.08		28.9	SURCHARGED	
1.009	36	0.574	0.000	0.26		245.7	SURCHARGED	
7.000	37	0.041	0.000	1.75		7.0	SURCHARGED	
7.001	38	-0.053	0.000	0.44		7.1	OK	
8.000	39	-0.139	0.000	0.55		32.8	OK	
9.000	40	-0.058	0.000	0.37		3.5	OK	
8.001	41	-0.149	0.000	0.50		36.6	OK	
7.002	42	-0.207	0.000	0.21		43.7	OK	
10.000	43	-0.081	0.000	0.42		7.1	OK	
10.001	44	-0.111	0.000	0.51		19.2	OK	
10.002	45	-0.120	0.000	0.44		25.1	OK	
11.000	46	-0.100	0.000	0.00		0.0	OK	
11.001	47	-0.097	0.000	0.27		6.1	OK	
12.000	48	0.239	0.000	1.16		16.5	SURCHARGED	
11.002	49	-0.174	0.000	0.09		8.7	OK	
11.003	50	-0.083	0.000	0.11		10.2	OK	
10.003	51	-0.017	0.000	0.08		16.0	OK	
7.003	52	0.256	0.000	0.13		24.3	SURCHARGED	
7.004	53	0.320	0.000	0.46		181.2	SURCHARGED	
1.010	54	1.442	0.000	0.29		157.1	SURCHARGED	
13.000	55	-0.070	0.000	0.54		10.4	OK	
13.001	56	-0.005	0.000	0.08		2.7	OK	
1.011	57	2.465	0.000	2.50		74.0	SURCHARGED	
14.000	58	-0.096	0.000	0.27		4.7	OK	
15.000	59	-0.111	0.000	0.50		24.3	OK	
16.000	60	-0.096	0.000	0.27		7.4	OK	
14.001	61	-0.115	0.000	0.47		40.3	OK	
17.000	62	-0.096	0.000	0.27		4.7	OK	
17.001	63	-0.088	0.000	0.36		8.7	OK	
18.000	64	-0.059	0.000	0.35		8.2	OK	
14.002	65	-0.148	0.000	0.68		57.3	OK	
14.003	66	-0.239	0.000	0.29		26.8	OK	
1.012	67	-0.295	0.000	0.19		80.1	OK	
1.013	68	-0.309	0.000	0.12		64.1	OK	
19.000	1	-0.075	0.000	0.50		8.5	OK	
19.001	2	-0.178	0.000	0.34		22.5	OK	
19.002	3	-0.214	0.000	0.18		29.5	OK	
20.000	4	-0.079	0.000	0.44		7.4	OK	
20.001	5	-0.119	0.000	0.44		35.8	OK	
19.003	6	-0.115	0.000	0.11		11.2	OK	
21.000	7	-0.078	0.000	0.47		8.5	OK	
22.000	8	0.088	0.000	2.28		9.0	SURCHARGED	
22.001	9	-0.088	0.000	0.36		8.9	OK	
21.001	10	-0.154	0.000	0.48		31.2	OK	
23.000	11	0.294	0.000	3.92		15.4	SURCHARGED	
23.001	12	-0.029	0.000	0.86		15.4	OK	
21.002	13	-0.184	0.000	0.51		46.0	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.003	14	-0.186	0.000	0.50		51.6	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
21.004	15	15 Winter	1	+0%	30/180 Winter				78.040
19.004	16	360 Winter	1	+0%	1/120 Winter				77.466
19.005	17	360 Winter	1	+0%	1/120 Winter				77.466
1.014	69	360 Winter	1	+0%	1/120 Winter				77.465

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.004	15	-0.275	0.000	0.16		51.8	OK	
19.004	16	0.056	0.000	0.09		20.2	SURCHARGED	
19.005	17	0.103	0.000	0.02		5.2	SURCHARGED	
1.014	69	0.114	0.000	0.01		12.4	SURCHARGED	

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 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	14
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	0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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)	1, 30, 100
Climate Change (%)	0, 0, 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	18	15 Winter	30	+0%	30/15 Summer				81.434
1.001	19	15 Winter	30	+0%	30/15 Summer				80.751
1.002	20	600 Winter	30	+0%	30/15 Winter				80.683
1.003	21	600 Winter	30	+0%	30/15 Summer				80.683
1.004	22	600 Winter	30	+0%	30/15 Summer				80.685
2.000	23	15 Winter	30	+0%	30/15 Summer				81.357
2.001	24	600 Winter	30	+0%	30/15 Summer				80.681
2.002	25	600 Winter	30	+0%	30/15 Summer				80.682
3.000	26	600 Winter	30	+0%	30/360 Winter				80.673
4.000	27	600 Winter	30	+0%	30/15 Summer				80.675
3.001	28	600 Winter	30	+0%	30/15 Summer				80.674
1.005	29	600 Winter	30	+0%	30/15 Summer				80.684
5.000	30	15 Winter	30	+0%	1/15 Summer				81.340
6.000	31	30 Winter	30	+0%	1/15 Summer				81.434
5.001	32	600 Winter	30	+0%	100/120 Winter				80.689
1.006	33	600 Winter	30	+0%	30/30 Winter				80.690
1.007	34	600 Winter	30	+0%	30/30 Winter				80.690

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	18	0.234	0.000	1.18		22.8	SURCHARGED	
1.001	19	0.041	0.000	1.11		73.1	SURCHARGED	
1.002	20	0.133	0.000	0.09		9.3	SURCHARGED	
1.003	21	0.248	0.000	0.09		9.3	SURCHARGED	
1.004	22	0.355	0.000	0.09		9.2	SURCHARGED	
2.000	23	0.257	0.000	1.15		22.3	SURCHARGED	
2.001	24	0.127	0.000	0.11		7.0	SURCHARGED	
2.002	25	0.257	0.000	0.09		9.3	SURCHARGED	
3.000	26	0.073	0.000	0.07		8.4	SURCHARGED	
4.000	27	0.300	0.000	0.09		2.7	SURCHARGED	
3.001	28	0.338	0.000	0.09		11.2	SURCHARGED	
1.005	29	0.448	0.000	0.20		33.0	SURCHARGED	
5.000	30	0.540	0.000	5.29		20.8	SURCHARGED	
6.000	31	0.634	0.000	5.72		22.5	SURCHARGED	
5.001	32	-0.095	0.000	0.09		10.0	OK	
1.006	33	0.529	0.000	0.12		39.2	SURCHARGED	
1.007	34	0.600	0.000	1.40		276.8	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.008	35	120 Winter	30	+0%	1/120 Winter				81.342
1.009	36	600 Winter	30	+0%	1/60 Winter				81.468
7.000	37	15 Winter	30	+0%	1/15 Summer				81.124
7.001	38	15 Winter	30	+0%	100/15 Summer				80.776
8.000	39	600 Winter	30	+0%	30/15 Summer				80.685
9.000	40	15 Winter	30	+0%	100/15 Summer				80.825
8.001	41	600 Winter	30	+0%	30/15 Summer				80.685
7.002	42	600 Winter	30	+0%	30/120 Winter				80.690
10.000	43	15 Winter	30	+0%	30/15 Summer				81.344
10.001	44	15 Winter	30	+0%	30/15 Summer				81.105
10.002	45	15 Winter	30	+0%	30/15 Summer				80.851
11.000	46	360 Winter	30	+0%	100/120 Winter				80.750
11.001	47	15 Winter	30	+0%	100/15 Summer				80.688
12.000	48	15 Winter	30	+0%	1/15 Summer				81.404
11.002	49	600 Winter	30	+0%	30/30 Winter				80.696
11.003	50	600 Winter	30	+0%	30/15 Winter				80.694
10.003	51	600 Winter	30	+0%	30/15 Summer				80.694
7.003	52	600 Winter	30	+0%	1/30 Summer				80.695
7.004	53	600 Winter	30	+0%	1/15 Winter				80.697
1.010	54	600 Winter	30	+0%	1/15 Summer				81.353
13.000	55	15 Winter	30	+0%	30/15 Summer				81.404
13.001	56	120 Winter	30	+0%	30/15 Winter				80.938
1.011	57	120 Summer	30	+0%	1/15 Summer				81.647
14.000	58	15 Winter	30	+0%	100/15 Summer				78.942
15.000	59	15 Winter	30	+0%	30/15 Summer				78.939
16.000	60	15 Winter	30	+0%	100/15 Summer				78.818
14.001	61	15 Winter	30	+0%	30/15 Summer				78.719
17.000	62	15 Winter	30	+0%	100/15 Winter				78.942
17.001	63	15 Winter	30	+0%	100/15 Summer				78.554
18.000	64	15 Winter	30	+0%	100/15 Summer				78.772
14.002	65	480 Winter	30	+0%	30/15 Summer				78.650
14.003	66	480 Winter	30	+0%	30/120 Winter				78.701
1.012	67	480 Winter	30	+0%	30/60 Winter				79.006
1.013	68	480 Winter	30	+0%	30/30 Winter				79.074
19.000	1	15 Winter	30	+0%	30/15 Summer				79.100
19.001	2	15 Winter	30	+0%	100/15 Summer				78.574
19.002	3	480 Winter	30	+0%	30/480 Winter				78.579
20.000	4	480 Winter	30	+0%	30/15 Summer				78.596
20.001	5	480 Winter	30	+0%	30/15 Summer				78.693
19.003	6	480 Winter	30	+0%	30/15 Summer				78.773
21.000	7	15 Winter	30	+0%	30/15 Summer				79.089
22.000	8	15 Winter	30	+0%	1/15 Summer				79.374
22.001	9	15 Winter	30	+0%	100/15 Summer				78.838
21.001	10	480 Winter	30	+0%	30/15 Summer				78.638
23.000	11	15 Winter	30	+0%	1/15 Summer				79.427
23.001	12	15 Winter	30	+0%	30/15 Summer				78.946
21.002	13	480 Winter	30	+0%	30/15 Summer				78.896
21.003	14	480 Winter	30	+0%	30/15 Summer				78.945

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.008	35	1.271	0.000	0.18		62.7	SURCHARGED	
1.009	36	1.491	0.000	0.25		235.3	SURCHARGED	
7.000	37	0.324	0.000	4.03		16.2	SURCHARGED	
7.001	38	-0.003	0.000	1.00		16.0	OK	
8.000	39	0.085	0.000	0.12		7.3	SURCHARGED	
9.000	40	-0.025	0.000	0.90		8.5	OK	
8.001	41	0.148	0.000	0.11		8.1	SURCHARGED	
7.002	42	0.239	0.000	0.05		10.0	SURCHARGED	
10.000	43	0.144	0.000	0.94		16.1	SURCHARGED	
10.001	44	0.191	0.000	1.24		47.1	SURCHARGED	
10.002	45	0.113	0.000	1.07		60.4	SURCHARGED	
11.000	46	-0.100	0.000	0.00		0.0	OK	
11.001	47	-0.046	0.000	0.82		19.0	OK	
12.000	48	0.554	0.000	1.35		19.2	SURCHARGED	
11.002	49	0.526	0.000	0.10		10.0	SURCHARGED	
11.003	50	0.616	0.000	0.13		11.9	SURCHARGED	
10.003	51	0.678	0.000	0.09		18.8	SURCHARGED	
7.003	52	0.940	0.000	0.14		27.2	SURCHARGED	
7.004	53	1.005	0.000	0.51		199.7	SURCHARGED	
1.010	54	1.923	0.000	0.28		151.3	SURCHARGED	
13.000	55	0.204	0.000	1.20		23.2	SURCHARGED	
13.001	56	0.166	0.000	0.38		13.3	SURCHARGED	
1.011	57	2.958	0.000	2.83		83.7	SURCHARGED	
14.000	58	-0.058	0.000	0.66		11.5	OK	
15.000	59	0.189	0.000	1.11		54.0	SURCHARGED	
16.000	60	-0.032	0.000	0.67		18.0	OK	
14.001	61	0.136	0.000	1.07		91.8	SURCHARGED	
17.000	62	-0.058	0.000	0.66		11.4	OK	
17.001	63	-0.015	0.000	0.93		22.6	OK	
18.000	64	-0.028	0.000	0.86		20.2	OK	
14.002	65	0.567	0.000	0.18		15.5	SURCHARGED	
14.003	66	0.661	0.000	1.04		97.7	SURCHARGED	
1.012	67	1.030	0.000	0.24		100.5	SURCHARGED	
1.013	68	1.280	0.000	0.13		65.2	SURCHARGED	
19.000	1	0.100	0.000	1.12		19.3	SURCHARGED	
19.001	2	-0.067	0.000	0.92		60.2	OK	
19.002	3	0.085	0.000	0.17		28.0	SURCHARGED	
20.000	4	0.496	0.000	0.47		7.9	SURCHARGED	
20.001	5	0.784	0.000	0.41		32.8	SURCHARGED	
19.003	6	1.193	0.000	0.51		53.0	SURCHARGED	
21.000	7	0.089	0.000	1.05		19.3	SURCHARGED	
22.000	8	0.474	0.000	4.96		19.5	SURCHARGED	
22.001	9	-0.049	0.000	0.79		19.5	OK	
21.001	10	0.070	0.000	0.16		10.3	SURCHARGED	
23.000	11	0.527	0.000	4.91		19.3	SURCHARGED	
23.001	12	0.060	0.000	1.08		19.3	SURCHARGED	
21.002	13	0.427	0.000	0.30		27.3	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.003	14	0.526	0.000	0.29		30.4	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
21.004	15	480 Winter	30	+0%	30/180 Winter				79.028
19.004	16	480 Winter	30	+0%	1/120 Winter				78.992
19.005	17	480 Winter	30	+0%	1/120 Winter				79.056
1.014	69	480 Winter	30	+0%	1/120 Winter				79.077

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.004	15	0.713	0.000	0.15		47.1	FLOOD RISK	
19.004	16	1.582	0.000	0.24		55.7	SURCHARGED	
19.005	17	1.693	0.000	0.14		29.1	SURCHARGED	
1.014	69	1.726	0.000	0.01		12.4	SURCHARGED	

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	14
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	0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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)	1, 30, 100
Climate Change (%)	0, 0, 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	18	15 Winter	100	+0%	30/15 Summer				81.944
1.001	19	600 Winter	100	+0%	30/15 Summer				81.347
1.002	20	600 Winter	100	+0%	30/15 Winter				81.346
1.003	21	600 Winter	100	+0%	30/15 Summer				81.345
1.004	22	720 Winter	100	+0%	30/15 Summer				81.344
2.000	23	15 Winter	100	+0%	30/15 Summer				81.872
2.001	24	600 Winter	100	+0%	30/15 Summer				81.344
2.002	25	720 Winter	100	+0%	30/15 Summer				81.344
3.000	26	600 Winter	100	+0%	30/360 Winter				81.342
4.000	27	720 Winter	100	+0%	30/15 Summer				81.337
3.001	28	600 Winter	100	+0%	30/15 Summer				81.340
1.005	29	720 Winter	100	+0%	30/15 Summer				81.345
5.000	30	15 Winter	100	+0%	1/15 Summer				81.376
6.000	31	30 Winter	100	+0%	1/15 Summer				81.505
5.001	32	720 Winter	100	+0%	100/120 Winter				81.343
1.006	33	720 Winter	100	+0%	30/30 Winter				81.349
1.007	34	720 Winter	100	+0%	30/30 Winter				81.352

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	18	0.744	0.000	1.35		26.1	FLOOD RISK	
1.001	19	0.636	0.000	0.14		9.0	SURCHARGED	
1.002	20	0.795	0.000	0.12		11.8	SURCHARGED	
1.003	21	0.910	0.000	0.11		11.2	FLOOD RISK	
1.004	22	1.014	0.000	0.09		9.2	FLOOD RISK	
2.000	23	0.772	0.000	1.36		26.4	FLOOD RISK	
2.001	24	0.790	0.000	0.14		9.0	SURCHARGED	
2.002	25	0.919	0.000	0.11		11.5	SURCHARGED	
3.000	26	0.742	0.000	0.10		11.6	FLOOD RISK	
4.000	27	0.962	0.000	0.43		12.9	FLOOD RISK	
3.001	28	1.004	0.000	0.13		15.3	SURCHARGED	
1.005	29	1.109	0.000	0.20		33.5	SURCHARGED	
5.000	30	0.576	0.000	5.46		21.5	SURCHARGED	
6.000	31	0.705	0.000	6.02		23.7	FLOOD RISK	
5.001	32	0.559	0.000	0.10		11.1	SURCHARGED	
1.006	33	1.188	0.000	0.12		39.8	SURCHARGED	
1.007	34	1.261	0.000	1.41		279.0	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.008	35	120 Winter	100	+0%	1/120 Winter				81.613
1.009	36	180 Winter	100	+0%	1/60 Winter				81.720
7.000	37	600 Winter	100	+0%	1/15 Summer				81.344
7.001	38	600 Winter	100	+0%	100/15 Summer				81.344
8.000	39	600 Winter	100	+0%	30/15 Summer				81.346
9.000	40	600 Winter	100	+0%	100/15 Summer				81.346
8.001	41	600 Winter	100	+0%	30/15 Summer				81.345
7.002	42	600 Winter	100	+0%	30/120 Winter				81.344
10.000	43	15 Winter	100	+0%	30/15 Summer				81.862
10.001	44	15 Winter	100	+0%	30/15 Summer				81.578
10.002	45	600 Winter	100	+0%	30/15 Summer				81.348
11.000	46	600 Winter	100	+0%	100/120 Winter				81.344
11.001	47	600 Winter	100	+0%	100/15 Summer				81.346
12.000	48	15 Winter	100	+0%	1/15 Summer				81.462
11.002	49	600 Winter	100	+0%	30/30 Winter				81.346
11.003	50	600 Winter	100	+0%	30/15 Winter				81.346
10.003	51	720 Winter	100	+0%	30/15 Summer				81.345
7.003	52	720 Winter	100	+0%	1/30 Summer				81.346
7.004	53	720 Winter	100	+0%	1/15 Winter				81.349
1.010	54	240 Winter	100	+0%	1/15 Summer				81.469
13.000	55	15 Winter	100	+0%	30/15 Summer				81.731
13.001	56	600 Winter	100	+0%	30/15 Winter				81.343
1.011	57	30 Winter	100	+0%	1/15 Summer				81.741
14.000	58	15 Winter	100	+0%	100/15 Summer				79.215
15.000	59	15 Winter	100	+0%	30/15 Summer				79.351
16.000	60	480 Winter	100	+0%	100/15 Summer				79.205
14.001	61	480 Winter	100	+0%	30/15 Summer				79.202
17.000	62	480 Winter	100	+0%	100/15 Winter				79.204
17.001	63	480 Winter	100	+0%	100/15 Summer				79.199
18.000	64	480 Winter	100	+0%	100/15 Summer				79.196
14.002	65	480 Winter	100	+0%	30/15 Summer				79.193
14.003	66	480 Winter	100	+0%	30/120 Winter				79.190
1.012	67	480 Winter	100	+0%	30/60 Winter				79.185
1.013	68	480 Winter	100	+0%	30/30 Winter				79.182
19.000	1	15 Winter	100	+0%	30/15 Summer				79.385
19.001	2	480 Winter	100	+0%	100/15 Summer				79.173
19.002	3	480 Winter	100	+0%	30/480 Winter				79.169
20.000	4	600 Winter	100	+0%	30/15 Summer				79.113
20.001	5	480 Winter	100	+0%	30/15 Summer				79.143
19.003	6	480 Winter	100	+0%	30/15 Summer				79.164
21.000	7	15 Winter	100	+0%	30/15 Summer				79.435
22.000	8	15 Winter	100	+0%	1/15 Summer				79.400
22.001	9	480 Winter	100	+0%	100/15 Summer				79.198
21.001	10	480 Winter	100	+0%	30/15 Summer				79.193
23.000	11	15 Winter	100	+0%	1/15 Summer				79.473
23.001	12	480 Winter	100	+0%	30/15 Summer				79.192
21.002	13	480 Winter	100	+0%	30/15 Summer				79.189
21.003	14	480 Winter	100	+0%	30/15 Summer				79.185

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.008	35	1.542	0.000	0.39		139.6	SURCHARGED	
1.009	36	1.743	0.000	0.24		221.4	SURCHARGED	
7.000	37	0.544	0.000	0.52		2.1	SURCHARGED	
7.001	38	0.565	0.000	0.19		3.0	SURCHARGED	
8.000	39	0.746	0.000	0.28		17.0	FLOOD RISK	
9.000	40	0.496	0.000	0.13		1.2	SURCHARGED	
8.001	41	0.808	0.000	0.23		16.9	SURCHARGED	
7.002	42	0.893	0.000	0.08		16.8	SURCHARGED	
10.000	43	0.662	0.000	1.18		20.1	FLOOD RISK	
10.001	44	0.664	0.000	1.40		53.3	SURCHARGED	
10.002	45	0.610	0.000	0.14		8.2	SURCHARGED	
11.000	46	0.494	0.000	0.20		1.4	SURCHARGED	
11.001	47	0.612	0.000	0.15		3.5	SURCHARGED	
12.000	48	0.612	0.000	1.38		19.7	FLOOD RISK	
11.002	49	1.176	0.000	0.13		12.4	SURCHARGED	
11.003	50	1.267	0.000	0.15		14.3	SURCHARGED	
10.003	51	1.330	0.000	0.10		20.1	SURCHARGED	
7.003	52	1.591	0.000	0.16		29.9	SURCHARGED	
7.004	53	1.657	0.000	0.50		197.9	SURCHARGED	
1.010	54	2.040	0.000	0.24		128.3	SURCHARGED	
13.000	55	0.531	0.000	1.48		28.6	SURCHARGED	
13.001	56	0.572	0.000	0.30		10.5	SURCHARGED	
1.011	57	3.052	0.000	0.25		7.3	SURCHARGED	
14.000	58	0.215	0.000	0.72		12.4	SURCHARGED	
15.000	59	0.601	0.000	1.38		67.1	FLOOD RISK	
16.000	60	0.355	0.000	0.09		2.5	SURCHARGED	
14.001	61	0.619	0.000	0.16		14.0	SURCHARGED	
17.000	62	0.204	0.000	0.09		1.6	SURCHARGED	
17.001	63	0.631	0.000	0.13		3.2	SURCHARGED	
18.000	64	0.396	0.000	0.14		3.2	SURCHARGED	
14.002	65	1.110	0.000	0.24		20.0	SURCHARGED	
14.003	66	1.150	0.000	0.30		27.7	SURCHARGED	
1.012	67	1.209	0.000	0.11		45.5	SURCHARGED	
1.013	68	1.388	0.000	0.09		47.7	SURCHARGED	
19.000	1	0.385	0.000	1.40		24.1	SURCHARGED	
19.001	2	0.532	0.000	0.16		10.3	SURCHARGED	
19.002	3	0.675	0.000	0.12		19.6	SURCHARGED	
20.000	4	1.013	0.000	0.55		9.1	FLOOD RISK	
20.001	5	1.234	0.000	0.45		36.7	FLOOD RISK	
19.003	6	1.583	0.000	0.40		41.5	FLOOD RISK	
21.000	7	0.435	0.000	1.28		23.4	SURCHARGED	
22.000	8	0.500	0.000	5.07		19.9	SURCHARGED	
22.001	9	0.311	0.000	0.13		3.1	SURCHARGED	
21.001	10	0.624	0.000	0.34		22.2	SURCHARGED	
23.000	11	0.573	0.000	5.02		19.7	SURCHARGED	
23.001	12	0.306	0.000	0.35		6.3	SURCHARGED	
21.002	13	0.719	0.000	0.28		25.5	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.003	14	0.767	0.000	0.29		30.4	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
21.004	15	480 Winter	100	+0%	30/180 Winter				79.180
19.004	16	480 Winter	100	+0%	1/120 Winter				79.175
19.005	17	480 Winter	100	+0%	1/120 Winter				79.176
1.014	69	480 Winter	100	+0%	1/120 Winter				79.177

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.004	15	0.865	0.000	0.14		45.9	FLOOD RISK	
19.004	16	1.766	0.000	0.29		66.3	SURCHARGED	
19.005	17	1.813	0.000	0.23		48.9	SURCHARGED	
1.014	69	1.826	0.000	0.01		13.2	SURCHARGED	

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	14
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 0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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 (%)	20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	18	15 Winter	100	+20%	100/15 Summer	100/15 Summer		
1.001	19	960 Winter	100	+20%	100/15 Summer			
1.002	20	960 Winter	100	+20%	100/15 Summer			
1.003	21	960 Winter	100	+20%	100/15 Summer	100/180 Winter		
1.004	22	960 Winter	100	+20%	100/15 Summer	100/180 Winter		
2.000	23	15 Winter	100	+20%	100/15 Summer	100/15 Summer		
2.001	24	960 Winter	100	+20%	100/15 Summer			
2.002	25	600 Winter	100	+20%	100/15 Summer			
3.000	26	960 Winter	100	+20%	100/15 Summer	100/360 Winter		
4.000	27	960 Winter	100	+20%	100/15 Summer			
3.001	28	960 Winter	100	+20%	100/15 Summer			
1.005	29	960 Winter	100	+20%	100/15 Summer			
5.000	30	600 Winter	100	+20%	100/15 Summer			
6.000	31	30 Winter	100	+20%	100/15 Summer			
5.001	32	600 Winter	100	+20%	100/60 Summer			
1.006	33	600 Winter	100	+20%	100/15 Summer	100/600 Winter		
1.007	34	960 Winter	100	+20%	100/15 Summer	100/360 Winter		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	18	82.102	0.902	1.665	1.54		29.8	FLOOD	3
1.001	19	81.514	0.803	0.000	0.14		9.3	SURCHARGED	
1.002	20	81.513	0.963	0.000	0.10		10.2	SURCHARGED	
1.003	21	81.512	1.077	12.171	0.16		16.3	FLOOD	8
1.004	22	81.516	1.186	16.477	0.89		87.0	FLOOD	7
2.000	23	82.002	0.902	1.685	1.53		29.6	FLOOD	3
2.001	24	81.653	1.099	0.000	0.17		10.7	SURCHARGED	
2.002	25	81.682	1.258	0.000	0.16		17.2	SURCHARGED	
3.000	26	81.512	0.912	12.499	0.32		38.4	FLOOD	6
4.000	27	81.513	1.138	0.000	1.44		43.2	FLOOD RISK	
3.001	28	81.662	1.326	0.000	0.55		67.2	SURCHARGED	
1.005	29	81.687	1.451	0.000	0.90		151.6	SURCHARGED	
5.000	30	81.546	0.746	0.000	2.93		11.5	FLOOD RISK	
6.000	31	81.567	0.767	0.000	6.28		24.7	FLOOD RISK	
5.001	32	81.716	0.932	0.000	0.20		21.7	FLOOD RISK	
1.006	33	81.745	1.584	0.009	0.37		126.1	FLOOD	
1.007	34	81.756	1.665	6.218	1.57		309.2	FLOOD	6

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.008	35	960 Winter	100	+20%	100/15 Summer			
1.009	36	60 Winter	100	+20%	100/15 Summer	100/120 Winter		
7.000	37	600 Winter	100	+20%	100/15 Summer			
7.001	38	960 Winter	100	+20%	100/15 Summer			
8.000	39	960 Winter	100	+20%	100/15 Summer	100/180 Winter		
9.000	40	960 Winter	100	+20%	100/15 Summer			
8.001	41	960 Winter	100	+20%	100/15 Summer			
7.002	42	960 Winter	100	+20%	100/30 Summer			
10.000	43	15 Winter	100	+20%	100/15 Summer	100/15 Summer		
10.001	44	15 Winter	100	+20%	100/15 Summer			
10.002	45	600 Winter	100	+20%	100/15 Summer			
11.000	46	600 Winter	100	+20%	100/15 Summer			
11.001	47	600 Winter	100	+20%	100/15 Summer			
12.000	48	600 Winter	100	+20%	100/15 Summer			
11.002	49	960 Winter	100	+20%	100/15 Summer			
11.003	50	600 Winter	100	+20%	100/15 Summer			
10.003	51	960 Winter	100	+20%	100/15 Summer			
7.003	52	960 Winter	100	+20%	100/15 Summer			
7.004	53	720 Winter	100	+20%	100/15 Summer	100/360 Winter		
1.010	54	960 Winter	100	+20%	100/15 Summer			
13.000	55	15 Winter	100	+20%	100/15 Summer			
13.001	56	960 Winter	100	+20%	100/15 Summer			
1.011	57	960 Winter	100	+20%	100/15 Summer			
14.000	58	15 Winter	100	+20%	100/15 Summer			
15.000	59	15 Winter	100	+20%	100/15 Summer	100/15 Summer		
16.000	60	180 Winter	100	+20%	100/15 Summer			
14.001	61	240 Winter	100	+20%	100/15 Summer			
17.000	62	180 Winter	100	+20%	100/15 Summer			
17.001	63	180 Winter	100	+20%	100/15 Summer			
18.000	64	240 Winter	100	+20%	100/15 Summer			
14.002	65	240 Winter	100	+20%	100/15 Summer			
14.003	66	120 Winter	100	+20%	100/15 Winter			
1.012	67	720 Winter	100	+20%	100/15 Winter			
1.013	68	1440 Winter	100	+20%	100/15 Summer			
19.000	1	15 Winter	100	+20%	100/15 Summer			
19.001	2	180 Winter	100	+20%	100/15 Summer			
19.002	3	600 Winter	100	+20%	100/15 Summer			
20.000	4	960 Winter	100	+20%	100/15 Summer			
20.001	5	720 Winter	100	+20%	100/15 Summer	100/180 Winter		
19.003	6	600 Winter	100	+20%	100/15 Summer	100/120 Winter		
21.000	7	15 Winter	100	+20%	100/15 Summer			
22.000	8	15 Winter	100	+20%	100/15 Summer			
22.001	9	180 Winter	100	+20%	100/15 Summer			
21.001	10	180 Winter	100	+20%	100/15 Summer			
23.000	11	15 Winter	100	+20%	100/15 Summer			
23.001	12	240 Winter	100	+20%	100/15 Summer			
21.002	13	240 Winter	100	+20%	100/15 Summer			
21.003	14	240 Winter	100	+20%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.008	35	81.837	1.765	0.000	0.24		86.3	FLOOD RISK	
1.009	36	82.027	2.050	0.000	0.19		180.4	FLOOD RISK	
7.000	37	81.549	0.749	0.000	1.94		7.8	FLOOD RISK	
7.001	38	81.641	0.862	0.000	0.44		7.0	FLOOD RISK	
8.000	39	81.526	0.926	25.860	1.03		61.6	FLOOD	8
9.000	40	81.597	0.747	0.000	0.42		4.0	FLOOD RISK	
8.001	41	81.723	1.186	0.000	0.82		60.6	FLOOD RISK	
7.002	42	81.725	1.274	0.000	0.30		62.7	FLOOD RISK	
10.000	43	82.102	0.902	1.520	1.54		26.4	FLOOD	2
10.001	44	82.021	1.107	0.000	1.52		57.8	FLOOD RISK	
10.002	45	81.693	0.955	0.000	0.23		13.0	SURCHARGED	
11.000	46	81.536	0.686	0.000	0.98		7.0	FLOOD RISK	
11.001	47	81.647	0.912	0.000	0.33		7.6	SURCHARGED	
12.000	48	81.573	0.723	0.000	0.55		7.8	FLOOD RISK	
11.002	49	81.718	1.548	0.000	0.15		14.9	SURCHARGED	
11.003	50	81.726	1.648	0.000	0.20		18.7	SURCHARGED	
10.003	51	81.731	1.715	0.000	0.14		28.1	SURCHARGED	
7.003	52	81.742	1.988	0.000	0.34		65.2	FLOOD RISK	
7.004	53	81.755	2.063	4.888	0.54		214.0	FLOOD	6
1.010	54	81.895	2.466	0.000	0.28		151.9	FLOOD RISK	
13.000	55	82.052	0.852	0.000	1.70		32.8	FLOOD RISK	
13.001	56	81.769	0.998	0.000	0.30		10.7	SURCHARGED	
1.011	57	81.921	3.232	0.000	0.29		8.5	FLOOD RISK	
14.000	58	79.554	0.554	0.000	0.81		14.0	SURCHARGED	
15.000	59	79.651	0.901	0.762	1.55		75.2	FLOOD	1
16.000	60	79.524	0.674	0.000	0.33		8.8	FLOOD RISK	
14.001	61	79.555	0.972	0.000	0.41		35.1	SURCHARGED	
17.000	62	79.534	0.534	0.000	0.24		4.2	SURCHARGED	
17.001	63	79.523	0.954	0.000	0.41		10.1	SURCHARGED	
18.000	64	79.396	0.596	0.000	0.37		8.6	SURCHARGED	
14.002	65	79.670	1.587	0.000	0.49		41.5	FLOOD RISK	
14.003	66	79.664	1.624	0.000	0.64		59.8	FLOOD RISK	
1.012	67	79.697	1.721	0.000	0.08		34.3	FLOOD RISK	
1.013	68	79.700	1.906	0.000	0.06		33.0	FLOOD RISK	
19.000	1	79.728	0.728	0.000	1.59		27.4	FLOOD RISK	
19.001	2	79.341	0.700	0.000	0.45		29.4	SURCHARGED	
19.002	3	79.332	0.838	0.000	0.24		38.6	SURCHARGED	
20.000	4	79.318	1.218	0.000	0.38		6.3	FLOOD RISK	
20.001	5	79.323	1.414	22.724	0.40		32.2	FLOOD	8
19.003	6	79.331	1.750	30.911	0.86		88.9	FLOOD	12
21.000	7	79.768	0.768	0.000	1.48		27.2	FLOOD RISK	
22.000	8	79.432	0.532	0.000	5.20		20.5	SURCHARGED	
22.001	9	79.368	0.481	0.000	0.41		10.2	SURCHARGED	
21.001	10	79.359	0.790	0.000	0.69		45.5	SURCHARGED	
23.000	11	79.515	0.615	0.000	5.12		20.1	FLOOD RISK	
23.001	12	79.373	0.488	0.000	0.72		13.0	SURCHARGED	
21.002	13	79.354	0.885	0.000	0.62		56.1	SURCHARGED	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.003	14	79.350	0.931	0.000	0.54		55.5	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
21.004	15	240 Winter	100	+20%	100/30 Winter	100/120 Winter		
19.004	16	480 Winter	100	+20%	100/15 Summer	100/120 Winter		
19.005	17	240 Winter	100	+20%	100/15 Summer	100/120 Winter		
1.014	69	1440 Winter	100	+20%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.004	15	79.344	1.029	43.875	0.26		85.0	FLOOD	12
19.004	16	79.501	2.091	0.637	0.42		96.2	FLOOD	9
19.005	17	79.504	2.141	3.698	0.40		84.4	FLOOD	11
1.014	69	79.722	2.371	0.000	0.01		13.8	FLOOD RISK	

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	14
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 0.418
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.500	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia 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 (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	18	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
1.001	19	15 Winter	100	+40%	100/15 Summer			
1.002	20	960 Winter	100	+40%	100/15 Summer			
1.003	21	960 Winter	100	+40%	100/15 Summer	100/60 Winter		
1.004	22	960 Winter	100	+40%	100/15 Summer	100/60 Winter		
2.000	23	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
2.001	24	240 Winter	100	+40%	100/15 Summer			
2.002	25	1440 Winter	100	+40%	100/15 Summer			
3.000	26	960 Winter	100	+40%	100/15 Summer	100/120 Winter		
4.000	27	960 Winter	100	+40%	100/15 Summer			
3.001	28	1440 Winter	100	+40%	100/15 Summer			
1.005	29	1440 Winter	100	+40%	100/15 Summer			
5.000	30	720 Winter	100	+40%	100/15 Summer			
6.000	31	30 Winter	100	+40%	100/15 Summer	100/30 Winter		
5.001	32	240 Winter	100	+40%	100/30 Winter	100/60 Winter		
1.006	33	720 Winter	100	+40%	100/15 Summer	100/60 Winter		
1.007	34	720 Summer	100	+40%	100/15 Summer	100/60 Winter		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	18	82.105	0.905	4.870	1.68		32.4	FLOOD	4
1.001	19	81.780	1.069	0.000	1.57		103.6	SURCHARGED	
1.002	20	81.561	1.010	0.000	0.12		11.7	SURCHARGED	
1.003	21	81.560	1.125	60.055	0.26		25.4	FLOOD	21
1.004	22	81.564	1.233	63.880	0.89		87.2	FLOOD	20
2.000	23	82.005	0.905	4.526	1.60		31.1	FLOOD	4
2.001	24	81.699	1.145	0.000	0.40		25.8	SURCHARGED	
2.002	25	81.700	1.276	0.000	0.16		17.7	SURCHARGED	
3.000	26	81.564	0.964	63.690	0.35		41.9	FLOOD	20
4.000	27	81.563	1.188	0.000	1.45		43.4	FLOOD RISK	
3.001	28	81.693	1.357	0.000	0.55		67.0	SURCHARGED	
1.005	29	81.703	1.467	0.000	0.89		151.1	FLOOD RISK	
5.000	30	81.600	0.800	0.000	2.87		11.3	FLOOD RISK	
6.000	31	81.750	0.950	0.441	6.97		27.4	FLOOD	1
5.001	32	81.738	0.955	0.000	0.28		31.5	FLOOD RISK	
1.006	33	81.750	1.589	0.029	0.37		126.7	FLOOD	2
1.007	34	81.756	1.666	6.353	1.68		331.7	FLOOD	20

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.008	35	2880 Winter	100	+40%	100/15 Summer	100/60 Winter		
1.009	36	120 Summer	100	+40%	100/15 Summer	100/30 Winter		
7.000	37	240 Winter	100	+40%	100/15 Summer			
7.001	38	360 Winter	100	+40%	100/15 Summer			
8.000	39	720 Winter	100	+40%	100/15 Summer	100/60 Winter		
9.000	40	600 Winter	100	+40%	100/15 Summer			
8.001	41	960 Winter	100	+40%	100/15 Summer			
7.002	42	600 Winter	100	+40%	100/15 Winter			
10.000	43	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
10.001	44	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
10.002	45	15 Winter	100	+40%	100/15 Summer			
11.000	46	360 Winter	100	+40%	100/15 Summer			
11.001	47	360 Winter	100	+40%	100/15 Summer			
12.000	48	240 Winter	100	+40%	100/15 Summer	100/120 Winter		
11.002	49	240 Winter	100	+40%	100/15 Summer			
11.003	50	180 Winter	100	+40%	100/15 Summer			
10.003	51	180 Winter	100	+40%	100/15 Summer			
7.003	52	180 Winter	100	+40%	100/15 Summer			
7.004	53	2880 Winter	100	+40%	100/15 Summer	100/60 Winter		
1.010	54	2160 Winter	100	+40%	100/15 Summer			
13.000	55	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
13.001	56	180 Winter	100	+40%	100/15 Summer			
1.011	57	2160 Winter	100	+40%	100/15 Summer			
14.000	58	15 Winter	100	+40%	100/15 Summer			
15.000	59	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
16.000	60	15 Winter	100	+40%	100/15 Summer			
14.001	61	180 Winter	100	+40%	100/15 Summer			
17.000	62	120 Winter	100	+40%	100/15 Summer			
17.001	63	180 Winter	100	+40%	100/15 Summer			
18.000	64	180 Winter	100	+40%	100/15 Summer			
14.002	65	120 Winter	100	+40%	100/15 Summer	100/240 Winter		
14.003	66	120 Winter	100	+40%	100/15 Summer			
1.012	67	600 Winter	100	+40%	100/15 Summer			
1.013	68	480 Winter	100	+40%	100/15 Summer			
19.000	1	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
19.001	2	120 Winter	100	+40%	100/15 Summer			
19.002	3	600 Winter	100	+40%	100/15 Summer			
20.000	4	960 Winter	100	+40%	100/15 Summer			
20.001	5	960 Winter	100	+40%	100/15 Summer	100/60 Winter		
19.003	6	600 Winter	100	+40%	100/15 Summer	100/60 Summer		
21.000	7	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
22.000	8	15 Winter	100	+40%	100/15 Summer			
22.001	9	60 Winter	100	+40%	100/15 Summer			
21.001	10	240 Winter	100	+40%	100/15 Summer			
23.000	11	30 Winter	100	+40%	100/15 Summer			
23.001	12	60 Winter	100	+40%	100/15 Summer			
21.002	13	240 Winter	100	+40%	100/15 Summer			
21.003	14	240 Winter	100	+40%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.008	35	81.837	1.766	0.000	0.23		82.7	FLOOD RISK	
1.009	36	82.101	2.124	1.629	0.28		258.2	FLOOD	2
7.000	37	81.619	0.819	0.000	1.97		7.9	FLOOD RISK	
7.001	38	81.682	0.903	0.000	0.42		6.8	FLOOD RISK	
8.000	39	81.591	0.991	90.898	1.02		60.9	FLOOD	21
9.000	40	81.644	0.794	0.000	0.40		3.8	FLOOD RISK	
8.001	41	81.735	1.198	0.000	0.81		59.9	FLOOD RISK	
7.002	42	81.734	1.283	0.000	0.29		60.7	FLOOD RISK	
10.000	43	82.106	0.906	5.665	1.90		32.4	FLOOD	4
10.001	44	82.101	1.187	1.407	1.52		57.7	FLOOD	2
10.002	45	81.824	1.087	0.000	1.45		82.2	FLOOD RISK	
11.000	46	81.616	0.766	0.000	0.94		6.7	FLOOD RISK	
11.001	47	81.711	0.977	0.000	0.32		7.3	SURCHARGED	
12.000	48	81.751	0.901	0.879	1.06		15.0	FLOOD	7
11.002	49	81.762	1.592	0.000	0.33		32.0	SURCHARGED	
11.003	50	81.756	1.678	0.000	0.48		44.7	SURCHARGED	
10.003	51	81.753	1.738	0.000	0.35		70.5	SURCHARGED	
7.003	52	81.752	1.997	0.000	0.58		110.6	FLOOD RISK	
7.004	53	81.755	2.063	4.955	0.65		256.8	FLOOD	20
1.010	54	81.899	2.470	0.000	0.28		154.2	FLOOD RISK	
13.000	55	82.101	0.901	1.349	1.74		33.5	FLOOD	3
13.001	56	81.859	1.088	0.000	0.50		17.7	FLOOD RISK	
1.011	57	81.924	3.235	0.000	0.29		8.5	FLOOD RISK	
14.000	58	79.783	0.783	0.000	0.99		17.1	FLOOD RISK	
15.000	59	79.656	0.906	5.746	1.68		81.4	FLOOD	7
16.000	60	79.701	0.851	0.000	1.09		29.5	FLOOD RISK	
14.001	61	79.701	1.118	0.000	0.50		42.7	FLOOD RISK	
17.000	62	79.681	0.681	0.000	0.39		6.7	FLOOD RISK	
17.001	63	79.657	1.089	0.000	0.47		11.4	FLOOD RISK	
18.000	64	79.482	0.682	0.000	0.38		8.9	FLOOD RISK	
14.002	65	79.726	1.643	0.000	0.97		82.1	FLOOD RISK	
14.003	66	79.723	1.683	0.000	0.66		61.4	FLOOD RISK	
1.012	67	79.710	1.734	0.000	0.10		41.0	FLOOD RISK	
1.013	68	79.701	1.907	0.000	0.09		44.3	FLOOD RISK	
19.000	1	79.901	0.901	1.238	1.77		30.4	FLOOD	2
19.001	2	79.377	0.736	0.000	0.55		36.4	SURCHARGED	
19.002	3	79.376	0.882	0.000	0.24		39.8	SURCHARGED	
20.000	4	79.366	1.266	0.000	0.61		10.2	FLOOD RISK	
20.001	5	79.369	1.460	69.316	0.33		26.9	FLOOD	19
19.003	6	79.373	1.793	73.454	0.85		88.2	FLOOD	21
21.000	7	79.901	0.901	0.834	1.64		30.1	FLOOD	2
22.000	8	79.471	0.571	0.000	5.37		21.1	SURCHARGED	
22.001	9	79.418	0.531	0.000	0.79		19.6	SURCHARGED	
21.001	10	79.401	0.832	0.000	0.72		46.9	SURCHARGED	
23.000	11	79.564	0.664	0.000	5.24		20.6	FLOOD RISK	
23.001	12	79.472	0.586	0.000	1.11		19.9	SURCHARGED	
21.002	13	79.396	0.926	0.000	0.57		51.3	SURCHARGED	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.003	14	79.391	0.972	0.000	0.52		54.1	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
21.004	15	240 Winter	100	+40%	100/30 Summer	100/60 Summer		
19.004	16	240 Winter	100	+40%	100/15 Summer	100/60 Winter		
19.005	17	720 Winter	100	+40%	100/15 Summer	100/60 Winter		
1.014	69	1440 Summer	100	+40%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.004	15	79.385	1.069	84.850	0.27		88.8	FLOOD	22
19.004	16	79.501	2.091	0.905	0.44		100.4	FLOOD	21
19.005	17	79.504	2.141	4.098	0.27		57.5	FLOOD	21
1.014	69	79.719	2.368	0.000	0.01		13.8	FLOOD RISK	