TECHNICAL NOTE

Job Name:	Grundon Services Ltd. Merton Street, Banbury
Job No:	49730/4001
Note No:	TN002
Date:	October 2020
Prepared By:	Elizabeth Edney
Subject:	**Surface Water Drainage Strategy for Planning ref. 16/00472/OUT**

1. Introduction and Planning Background

1.1. A planning application was submitted in 2016 for the re-development of the Grundon Services site located off Merton Street in Banbury to provide approximately 200 residential units.

1.2. A Flood Risk Assessment (FRA) was prepared in October 2015 by Stantec (formerly Peter Brett Associates (PBA)) and submitted to accompany this planning application (report ref. *33390/4001*). The FRA was updated in October 2017 to reflect the updated proposals and the release of the Environment Agency (EA) '*Flood Risk Assessments: Climate Change Allowances*' guidance in 2016.

1.3. Outline surface water drainage calculations were submitted as part of the FRA and Oxfordshire County Council (OCC) as the Lead Local Flood Authority (LLFA) have requested that more detailed calculations and information are submitted and in accordance with the latest planning policy/guidance.

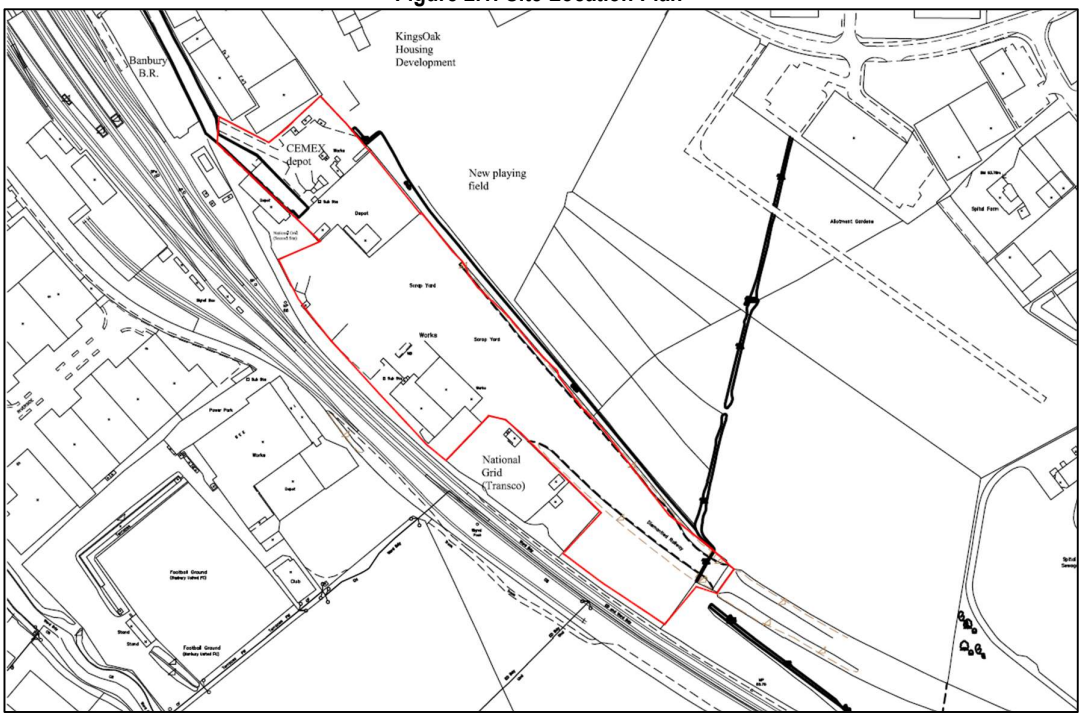
1.4. This Note outlines the requested surface water drainage information and has been prepared in accordance with the following planning policy and guidance:

- National policy regarding flood risk as contained within the **National Planning Policy Framework (NPPF)** updated June 2019, issued by the Ministry of Housing, Communities and Local Government, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change';
- The **NPPF Planning Practice Guidance (PPG)** released in March 2014 ('Flood Risk and Coastal Change' section) and updated in February 2016 to incorporate the **EA 'Flood Risk Assessments: Climate Change Allowances'** guidance (most recently updated July 2020);
- The **CIRIA 'SuDS Manual' C753**, November 2015;
- The **Written Ministerial Statement 'Sustainable Drainage Systems'**, December 2014;
- The **DEFRA 'Non-statutory Technical Standards for Sustainable Drainage Systems'** March 2015 and accompanying **Local Authority SuDS Officer Organisation (LASOO) Practice Guidance**, 2016;
- The **Oxfordshire County Council 'Local Standards and Guidance for Surface Water Drainage on Major Development Applications**, November 2018; and
- Local planning policy contained within the '**Cherwell Local Plan 2011-2031'** with particular reference to **'Policy ESD 6: Sustainable Flood Risk Management'** and **'Policy ESD 7: Sustainable Drainage Systems (SuDS)'**.

2. Site Background and Topography

2.1. The site is 3.05ha in area and is located to the south-west of the centre of Banbury in Oxfordshire (OS grid reference 446,480m E; 240,160m N) - see **Figure 2.1**.

Figure 2.1: Site Location Plan



2.2. The north-west corner of the site consists of a former concrete plant owned by CEMEX UK. This area has been cleared and was previously used as a site compound for the construction of the nearby multi-storey car park adjacent to the station.

2.3. The remainder of the site consists of a former gas works currently in operation by Grundon as a Refuse and Waste Collection Depot. This area comprises further hard standing and scrubland and also accommodates a number of structures (warehouses, workshops and offices).

2.4. The combined site is bound by the Chiltern Mainline Railway to the south-west, the existing residential development (by Kings Oak and Barteak Developments) to the north and playing fields and allotments to the east.

2.5. The site is accessed off Higham Way, which until recently comprised part of the wider land holding. The ownership of this access however was transferred to OCC in January 2013 and since this time the highway has been upgraded to adoptable standards.

2.6. The site topographic survey is provided in **Appendix TN002-A** and shows that the general ground levels across the range from 89.6m AOD to 91.0m AOD. The site is on a plateau elevated typically 1.0-1.5 metres above the fields to the immediate north.

3. Geology and Hydrogeology

3.1. Hydrock prepared a '*Ground Investigation*' report in May 2009 which summarises the ground conditions over the site as follows:

- Made Ground – variable granular and cohesive material characterised by predominantly granular demolition materials, foundry discards and cohesive re-worked Alluvial clay;
- Alluvium – clay and sandy clay with occasional sand and gravel horizons;
- River Terrace Deposits – gravelly sand and sandy gravel; and
- Lower Lias Clay (Jurassic) – stiff grey clay.

3.2. The report confirms that the Lower Lias clay is a non-aquifer and that the site does not lie within a Groundwater Source Protection Zone (SPZ).

4. Existing Site Drainage and Runoff Assessment

4.1. The existing site is conservatively estimated to be 65% impermeable with a total impermeable area of 1.98ha. The remaining 1.07ha is soft landscaping.

4.2. The existing brownfield runoff rates have been calculated using the Modified Rational Method and the greenfield runoff rates have been calculated within MicroDrainage (v.2020.1) using the IH 124/ICP SuDS method (see calculations in **Appendix TN002-B**) and are shown in **Table 4.1**.

Annual Probability Rainfall Event	Existing Brownfield Runoff Rate (1.98ha) l/s	Existing Greenfield Runoff Rate (1.07ha) l/s	Total Existing Runoff Rate (3.05ha) l/s
1 in 1 year	322.7	1.6	**324.3**
1 in 2 year/Q_{BAR}	411.2	1.9	**413.1**
1 in 30 year	754.7	3.9	**758.6**
1 in 100 year	931.7	5.0	**936.7**

Table 4.1: Existing Runoff Rates

5. Proposed Surface Water Drainage

Outfall Strategy

5.1. The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface water runoff from development sites and recommends that priority be given to the use of Sustainable Drainage Systems (SuDS) in new development.

5.2. The Building Regulations Requirement H3 and the Planning Practice Guidance for Flood Risk and Coastal Change (April 2015) stipulate that:

> ***...the aim should be to discharge surface water runoff 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 another drainage system,***
> ***- to a combined sewer***

5.3. The above hierarchy is considered below:

i) Discharge into the ground (Infiltration):

An assessment of the potential for infiltration drainage has been made in the '*Ground Investigation*' report by Hydrock mentioned in Section 3. The report concludes that:

> "*Due to the low permeability of the Lower Lias, pervasive contamination in the Made Ground and the depth of groundwater at the site, soakaway drainage is considered unfeasible and is not recommended.*"

As such the use of infiltration drainage at the site has been discounted.

ii) Discharge to a surface water body:

Where infiltration is not appropriate/feasible, the next preference in accordance with the above SuDS hierarchy is to discharge to a surface water body (i.e. lake, pond, watercourse).

A drainage channel runs in a south-easterly direction along the eastern boundary of the site, flowing south-east to eventually join the River Cherwell. As such, this is considered the most appropriate route for the disposal of surface water from the site.

Design Criteria

5.4. The proposals are for the re-development of the site to provide approximately 200 residential units with associated access road, parking, play areas, footpaths and landscaped areas.

5.5. The design criteria and proposed surface water drainage system has been assessed in accordance with the DEFRA '*Non-statutory technical standards for sustainable drainage systems*' and the OCC '*Local Standards and Guidance for Surface Water Drainage for Major Developments*' as demonstrated in the sections below.

5.6. The proposed surface water drainage network and attenuation features have been modelled within MicroDrainage using FEH rainfall data. OCC state in their 'SuDS Proforma' that they prefer a runoff coefficient (Cv) of 1 to be used, however the proposed development utilises extensive areas of permeable pavement which slows the rate of runoff and transfer time through the wider drainage system in comparison to tarmac surfacing and conventional gully/pipe systems. A Cv of 0.9 is therefore considered as appropriate.

5.7. The site has been considered in phases as shown on **Stantec drawing 49730/4001/001** in **Appendix TN002-C** and summarised below:

- Phase 1 – Blocks A and B (Impermeable area 0.26ha)
- Phase 2 – Blocks C, D, E and F (Impermeable area 0.68ha)
- Phase 3 – Blocks G and H (Impermeable area 0.26ha)
- Phase 4 – Blocks I and J (Impermeable area 0.23ha)

- Phase 5 – Blocks K1, K2 and L (Impermeable area 0.26ha)

5.8. The proposed access road will be constructed in sections associated with each development phase.

5.9. Local Standard L5 of the OCC '*Local Standards and Guidance*' document states that for all new residential development a 10% allowance for urban creep should be applied. Whilst it is acknowledged that impermeable area may increase during the lifetime of the development through the paving over of front gardens to create additional driveway space, this is unlikely for the proposed development as the residential development is apartment blocks and the parking is provided either as undercroft or external car parks.

5.10. The configuration of the access road, footpath and the external parking areas are such that additional parking is unlikely to be added. In addition, the communal hard standing has been defined at this stage and is also unlikely to increase due to its configuration. It is therefore considered that the 10% allowance for urban creep is not appropriate for the site.

5.11. The total impermeable area is therefore taken as 1.68ha.

5.12. As surface water will be discharged to a watercourse, an allowance for a surcharged outfall has been made within MicroDrainage across a 24hr period.

Proposed Runoff Rate and Volume Assessment

5.13. The DEFRA Standard S3 'Peak flow control' states that:

> *"S3. For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event."*

5.14. In addition, Local Standard L3 of the OCC '*Local Standards and Guidance*' document states that:

> "*L4 For brownfield or previously developed sites, where it is proposed to discharge runoff at rates greater than greenfield rates, evidence will be required to demonstrate why it is not feasible to achieve greenfield rates.*"

5.15. Pre-application advice from Cherwell District Council also stated that surface water runoff should be restricted to greenfield rates (Cherwell ref. *15/00161/Pre-App*).

5.16. The equivalent greenfield runoff rates for the impermeable area of each phase of development are shown in **Table 5.1**.

Annual Probability Rainfall Event	Equivalent Greenfield Runoff Rates (l/s)				
	Phase 1 (0.25ha)	Phase 2 (0.68ha)	Phase 3 (0.26ha)	Phase 4 (0.23ha)	Phase 5 (0.26ha)
1 in 1 year	0.4	1.0	0.4	0.3	0.4
1 in 2 year/Q_{BAR}	0.5	1.2	0.5	0.4	0.5
1 in 30 year	0.9	2.4	0.9	0.8	0.9
1 in 100 year	1.2	3.2	1.2	1.1	1.2

Table 5.1: Equivalent Greenfield Runoff Rates

5.17. The equivalent greenfield runoff rates for the 1 in 1 year and Q_{BAR} rainfall events are very small for all phases except Phase 2 and restricting to these rates for these phases will result in an unacceptable risk of blockage to the flow control.

5.18. The OCC '*Local Standards and Guidance*' document states the following in relation to runoff rate/ volume control and attenuation:

> "*There are two options for providing storage in order to limit peak discharge rates and volumes from the developed site: Either:*
>
> *Simple: Limit discharge rates for rainfall events up to and including the 1 in 100 year event (including climate change allowances) to the agreed QBAR rate (or 2 l/s/ha whichever is greater) and 1 in 1 year event to the corresponding greenfield event; OR*
>
> *Complex: For the greenfield volume, provide variable discharge rates to meet the equivalent 1 in 1, 1 in 30 and 1 in 100 rates, and either infiltrate or provide Long Term Storage for the additional volume of runoff produced by the development (the difference in runoff volume pre- and post-development of the 100 year 6 hour event), to discharge at rates below 2 l/s/ha*."

5.19. It is therefore proposed to restrict the runoff rate from the proposed impermeable areas as follows:

- Phase 1 and Phases 3-5: Runoff limited to a maximum of 1 l/s (approximately the 1 in 30 year greenfield runoff rate) for all rainfall events up to and including the 1 in 100 (1.0%) annual probability plus allowance for climate change rainfall event;
- Phase 2: Runoff limited to 1.0 l/s for the 1 in 1 year event and a maximum of 1.2 l/s (Q_{BAR} rate) for all rainfall events greater than this event in accordance with the OCC '*Local standards and guidance*' document;

5.20. The DEFRA Standards S5 and S6 'Volume control' state that:

> "**S5** *Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*
>
> **S6** *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S4** above, the runoff volume must be discharged at a rate that does not adversely affect flood risk*."

5.21. The existing runoff volume for the site for the 1 in 100 year 360minute rainfall event has been calculated using MicroDrainage Source Control and the Modified Rational Method as 2,320m^3. A copy of the calculations is provided in **Appendix TN002-B**.

5.22. The equivalent and proposed runoff volumes (based on a free-flowing outfall) for the impermeable area of each Phase are shown in **Table 5.2** and **Table 5.3** respectively. Copies of the calculations are provided in **Appendix TN002-B**. A comparison shows that the proposed runoff volumes are less than the equivalent greenfield volumes for the 1 in 100 year 360 minute rainfall event.

5.23. **Table 5.4** shows that there is an 81% reduction in runoff volumes in comparison to the existing site.

Annual Probability Rainfall Event	Equivalent Greenfield Runoff Volume (m^3)				
	Phase 1 (0.25ha)	Phase 2 (0.68ha)	Phase 3 (0.26ha)	Phase 4 (0.23ha)	Phase 5 (0.26ha)
1 in 100 year	51.1	139.1	53.2	47.0	53.2

Table 5.2: Equivalent Greenfield Runoff Volumes 1 in 100 year 6hr Rainfall Event

Annual Probability Rainfall Event	Proposed Runoff Volumes Impermeable Area (m^3)				
	Phase 1 (0.25ha)	Phase 2 (0.68ha)	Phase 3 (0.26ha)	Phase 4 (0.23ha)	Phase 5 (0.26ha)
1 in 100 year	35.0	36.3	35.0	35.8	33.9

Table 5.3: Proposed Runoff Volumes Impermeable Areas 1 in 100 year 6hr Rainfall Event

Annual Probability Rainfall Event	Proposed Runoff Volume (m^3)			
	Existing Runoff Volume (3.05ha)	Proposed Impermeable Areas (1.68ha)	Proposed Landscaped Areas (1.37ha)	Total Proposed Runoff Volume (3.05ha)
1 in 100 year	**2,320.0**	176.0	280.3	**456.3**

Table 5.4: Runoff Volumes Comparison 1 in 100 year 6hr Rainfall Event

Flood Risk within the Development

5.24. The DEFRA Standards for flood risk within the development are as follows:

> "**S7** *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year event.*
>
> **S8** *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement) or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*
>
> **S9** *The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*"

5.25. In addition to the above OCC '*Local Standards and Guidance*' Local Standards L6 and L10 state the following:

> *"L6 Flows across the site must be diverted away from buildings and main access-egress routes. This flooding should be assessed to ascertain if it is safe for the site users. All drainage schemes must suitably demonstrate that flooding will not occur to any habitable building for the worst case 1:100yr +40% climate change event.*
>
> *L10 All surface storage features should provide a minimum 300mm residual uncertainty allowance (freeboard) above the design maximum water level to top of bank and to finished floor levels around the site.*"

5.26. The proposed surface water drainage system for each Phase of development has been designed with no flooding up to and including the 1 in 100 (1.0%) annual probability rainfall event. Where surface attenuation features are proposed, the design water level is the maximum observed during this event and there is a minimum 300mm freeboard above top of bank (where feasible) and finished floor levels.

5.27. The finished floor level of each apartment block will be set at a minimum of 150mm above external ground level to mitigate against the residual risk of surface water ingress during an extreme rainfall event. Open landscaped areas will be profiled so that surface water runoff is directed away from the proposed apartment blocks in rainfall events in exceedance of the design event. It should be noted that certain apartment blocks will have all habitable floor levels at 1st floor level and above due to fluvial flood risk with undercroft parking beneath and therefore the freeboard will be greater than 150mm.

Impact of Climate Change

5.28. **Table 5.5** shows the climate change allowances for peak rainfall intensity, taken from the EA's '*Flood risk assessments - climate change allowances*' guidance.

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total anticipated change for 2060 to 2115
Upper End	+10%	+20%	**+40%**
Central	+5%	+10%	**+20%**

Table 5.5: Climate change allowances for peak rainfall intensity

5.29. The proposals are for residential and in accordance with the OCC '*Local Standards and Guidance*' document, the +40% allowance has been used.

5.30. The MicroDrainage results in **Appendix TN002-C** show that flooding occurs during the 1 in 100 annual probability +40% allowance for climate change rainfall event in the surcharged outfall scenario and this would pond in the landscaped and parking areas to depths of less than 100mm.

Water Quality & Maintenance

5.31. Water quality of the surface water runoff will be managed through the use of permeable pavements across the access road and parking areas and open attenuation features in Phases 1 and 2; therefore the surface water runoff will be sufficiently treated before it is discharged to the adjacent watercourse.

5.32. It is likely that the proposed surface water drainage system will be managed by a Maintenance Company and further details will be confirmed at a later stage.

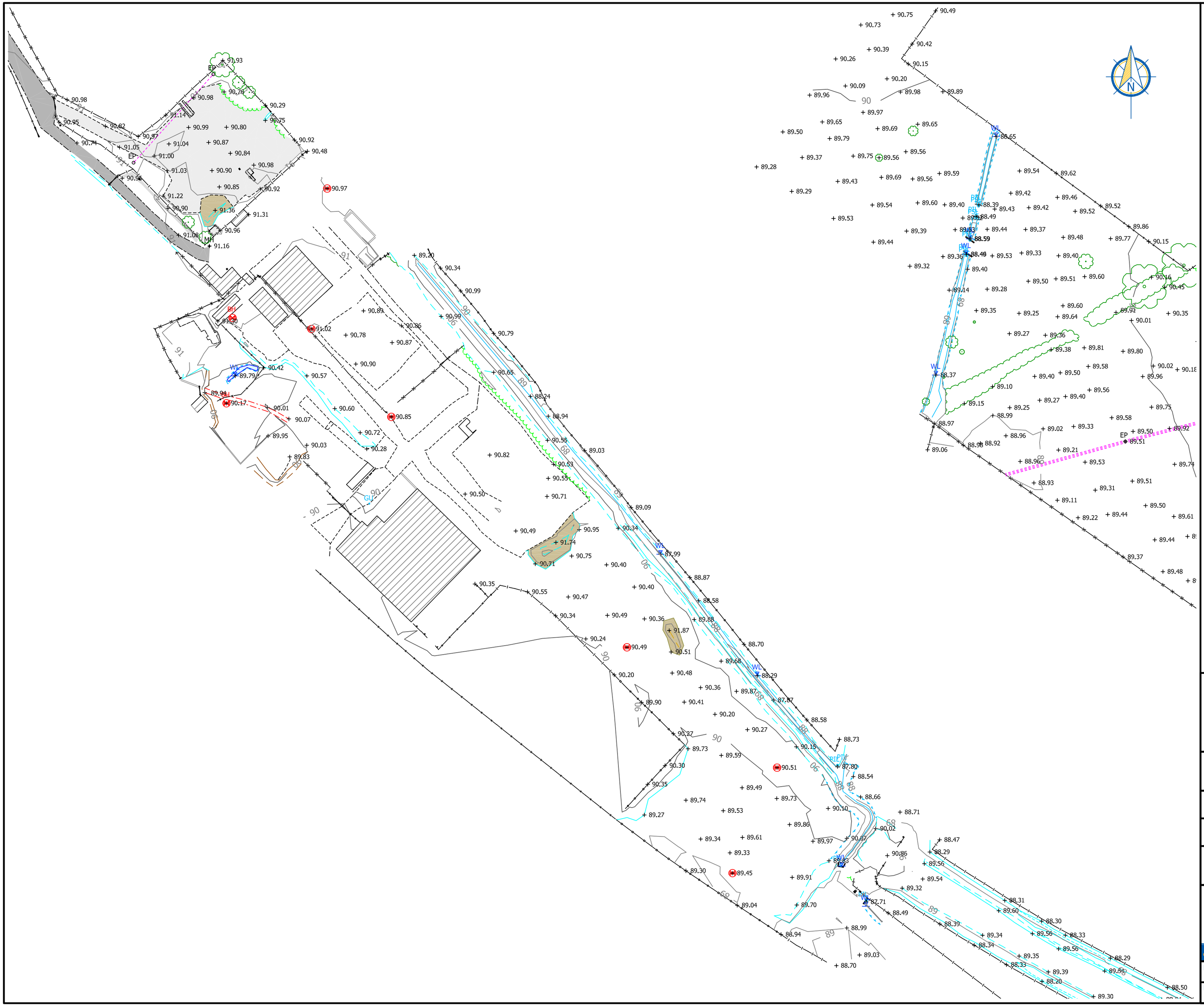
6. Summary

6.1. This Note demonstrates a suitable surface water drainage strategy for the site which complies with the DEFRA national and OCC local standards.

TECHNICAL NOTE

Appendix TN002-A

Topographic survey drawing BANB1301_A dated February 2013 by GWP Consultants



LEGEND

- Crest / Toe of batter
- Crest / Toe of ditch
- Concrete
- Road
- Security fence
- Chainlink fence
- Metal rail fence
- Electricity pole and overhead wires
- Edge of vegetation
- Gate
- Building
- Tree
- Borehole
- Water level
- Pipe invert level
- Selected survey level
- Manhole

NOTES

- Update survey of the Cemex yard and cleared area around the gas depot undertaken by GWP Consultants 31.01.2013 to OS grid and datum.
- Additional survey detail from previous GWP surveys (various dates)

Version	Revision and compilation notes	Date
A	Emailed to Stewart Mitchell	01.02.2013

Client: Grundon Waste Management Ltd

Project: Merton Street, Banbury

Update survey 31.01.2013

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Date	Drawn	Checked	Scale
01.02.2013	RM	EB	1:1000 at A2

Drawing Ref	Drawing No	Version
BANB1301	1	A

TECHNICAL NOTE

Appendix TN002-B

Greenfield Runoff Rates 1ha

Greenfield Runoff Volumes 1ha

Brownfield Runoff Rates and Volumes

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	1.000	Urban	0.000
SAAR (mm)	700	Region Number	Region 4

Results l/s

QBAR Rural	1.8
QBAR Urban	1.8
Q100 years	4.7
Q1 year	1.5
Q30 years	3.6
Q100 years	4.7

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Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Areal Reduction Factor	1.00
Area (ha)	1.000
SAAR (mm)	700
CWI	105.000
SPR Host	30.000
URBEXT (2000)	0.0000

Results

Percentage Runoff (%)	29.73
Greenfield Runoff Volume (m^3)	204.544

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Stantec	Grundon Waste Management, Banbury Surface Water Drainage Strategy Existing Brownfield Runoff - 1 in 1yr	JOB No: 49730		SHEET: 1 of 1
		DATE: 13/10/2020	BY: EE	CHECKED:

Calculation based on 'Modified Rational Method', HR Wallingford.

Assumes that water travels across the site at 1m/s from the furthest point to the connection with the existing network

Data

M5-60min 19.7 mm Q=2.78CiA
r 0.41

Calculation

Catchment Area	Impermeable Area	Duration (D)	Z1	M5-Dmin	Z2	M1-Dmin	i	Runoff Rate 1 in 1 yr	
	ha	min		mm		mm	mm/hr	l/s	
1	1.980	5	0.4	7.88	0.62	4.89	58.6	322.7	l/s
							Total	**322.7**	**l/s**

Note: Duration relates to time of concentration for the catchment including allowance for time of entry

D	*Z1*
5	*0.40*
10	*0.52*
15	*0.62*

M5	*Z2 for 1 in 1yr*
5	*0.62*
10	*0.61*
15	*0.62*

Stantec	Grundon Waste Management, Banbury Surface Water Drainage Strategy Existing Brownfield Runoff - 1 in 2yr	JOB No: 49730		SHEET: 1 of 1
		DATE: 13/10/2020	BY: EE	CHECKED:

Calculation based on 'Modified Rational Method', HR Wallingford.

Assumes that water travels across the site at 1m/s from the furthest point to the connection with the existing network

Data

M5-60min	19.7 mm	Q=2.78CiA
r	0.41	

Calculation

Catchment Area	Impermeable Area ha	Duration (D) min	Z1	M5-Dmin mm	Z2	M1-Dmin mm	i mm/hr	Runoff Rate 1 in 1 yr l/s	
1	1.980	5	0.4	7.88	0.79	6.23	74.7	411.2	l/s
							Total	**411.2**	**l/s**

Note: Duration relates to time of concentration for the catchment including allowance for time of entry

D	*Z1*
5	*0.40*
10	*0.52*
15	*0.62*

M5	*Z2 for 1 in 2yr*
5	*0.79*
10	*0.79*
15	*0.80*

Stantec	Grundon Waste Management, Banbury Surface Water Drainage Strategy Existing Brownfield Runoff - 1 in 30yr	JOB No: 49730		SHEET: 1 of 1
		DATE: 13/10/2020	BY: EE	CHECKED:

Calculation based on 'Modified Rational Method', HR Wallingford.

Assumes that water travels across the site at 1m/s from the furthest point to the connection with the existing network

Data

M5-60min	19.7 mm	Q=2.78CiA
r	0.41	

Calculation

Catchment Area	Impermeable Area ha	Duration (D) min	Z1	M5-Dmin mm	Z2	M30-Dmin mm	i mm/hr	Runoff Rate 1 in 30yr l/s
1	1.980	5	0.4	7.88	1.45	11.43	137.1	754.7
							Total	**754.7** l/s

Note: Duration relates to time of concentration for the catchment including allowance for time of entry

D	*Z1*
5	*0.40*
10	*0.52*
15	*0.62*

M5	*Z2 for 1 in 30yr*
5	*1.45*
10	*1.49*
15	*1.50*

Stantec	Grundon Waste Management Surface Water Drainage Strategy Existing Brownfield Runoff - 1 in 100yr	JOB No: 49730		SHEET: 1 of 1
		DATE: 29.07.20	BY: EE	CHECKED:

Calculation based on 'Modified Rational Method', HR Wallingford.

Assumes that water travels across the site at 1m/s from the furthest point to the connection with the existing network

Data

M5-60min 19.7 mm Q=2.78CiA
r 0.41

Calculation

Catchment Area	Impermeable Area ha	Duration (D) min	Z1	M5-Dmin mm	Z2	M100-Dmin mm	i mm/hr	Runoff Rate 1 in 100 yr l/s	
1	1.980	5	0.4	7.88	1.79	14.11	169.3	931.7	l/s
							Total	**931.7**	l/s

Note: Duration relates to time of concentration for the catchment including allowance for time of entry

D	*Z1*
5	*0.40*
10	*0.52*
15	*0.62*

M5	*Z2 for 1 in 100yr*
5	*1.79*
10	*1.91*
15	*1.99*

Volume Calculation

Rainfall depth derived for the 1 in 100 year 360 minute storm from the FEH CD-Rom

Rainfall depth 142.7 mm

Rainfall Intensity 23.8 mm/hr

Volume = 2.78CiA x 3600 x 6 /1000

Volume **2262.2** **m^3**

Grnfld Volume **57.6** **m^3**

TOTAL **2320** **m^3**

TECHNICAL NOTE

Appendix TN002-C

Stantec drawing 49730/4001/001 Proposed Surface Water Drainage Strategy

MicroDrainage schedule and results

DOCUMENT ISSUE RECORD

Technical Note No.	Rev	Date	Prepared	Reviewed	Approved
49730/4001/TN002	-	28/10/2020	E Edney	R Fisher	J Pulsford

This report has been prepared by Stantec UK Limited ('Stantec') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which Stantec was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). Stantec accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for PHASE 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	28.461	0.170	167.4	0.110	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	20.669	0.125	165.4	0.076	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	17.773	0.130	136.7	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	14.226	0.145	98.1	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	17.718	0.190	93.3	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	17.682	0.180	98.2	0.017	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	15.693	0.095	165.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	67.40	5.47	90.680	0.110	0.0	0.0	0.0	1.01	40.1	20.1
1.001	65.60	5.81	90.510	0.186	0.0	0.0	0.0	1.01	40.3	33.0
1.002	64.27	6.08	90.385	0.205	0.0	0.0	0.0	1.12	44.4	35.7
2.000	68.72	5.23	90.620	0.021	0.0	0.0	0.0	1.01	17.9	3.9
2.001	67.15	5.52	90.475	0.030	0.0	0.0	0.0	1.04	18.4	5.5
2.002	65.62	5.81	90.285	0.047	0.0	0.0	0.0	1.01	17.9	8.4
1.003	63.04	6.33	89.900	0.252	0.0	0.0	0.0	1.01	40.3«	43.1

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PIPELINE SCHEDULES for PHASE 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	91.250	90.680	0.345	Open Manhole	1200
1.001	o	225	2	91.150	90.510	0.415	Open Manhole	1200
1.002	o	225	3	91.140	90.385	0.530	Open Manhole	1200
2.000	o	150	4	91.140	90.620	0.370	Open Manhole	1200
2.001	o	150	5	91.130	90.475	0.505	Open Manhole	1200
2.002	o	150	6	91.130	90.285	0.695	Open Manhole	1200
1.003	o	225	7	91.130	89.900	1.005	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	28.461	167.4	2	91.150	90.510	0.415	Open Manhole	1200
1.001	20.669	165.4	3	91.140	90.385	0.530	Open Manhole	1200
1.002	17.773	136.7	7	91.130	90.255	0.650	Open Manhole	1200
2.000	14.226	98.1	5	91.130	90.475	0.505	Open Manhole	1200
2.001	17.718	93.3	6	91.130	90.285	0.695	Open Manhole	1200
2.002	17.682	98.2	7	91.130	90.105	0.875	Open Manhole	1200
1.003	15.693	165.2		90.500	89.805	0.470	Open Manhole	0

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Online Controls for PHASE 1

Hydro-Brake® Optimum Manhole: 7, DS/PN: 1.003, Volume (m³): 2.3

Unit Reference	MD-SHE-0046-1000-1100-1000
Design Head (m)	1.100
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	46
Invert Level (m)	89.900
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	1.0	Kick-Flo®	0.408	0.6
Flush-Flo™	0.200	0.8	Mean Flow over Head Range	-	0.8

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	0.7	1.200	1.0	3.000	1.6	7.000	2.3
0.200	0.8	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.8	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.7	1.800	1.2	4.500	1.9	8.500	2.5
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.6
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.2		

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Storage Structures for PHASE 1

Porous Car Park Manhole: 1, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	55.6	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.680	Cap Volume Depth (m)	0.360

Porous Car Park Manhole: 2, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	18.0
Max Percolation (l/s)	50.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.510	Cap Volume Depth (m)	0.430

Tank or Pond Manhole: 7, DS/PN: 1.003

Invert Level (m) 89.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	60.0	1.200	264.2

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	90.760	-0.145	0.000	2.910	10.1	OK
1.001	2	30	91.150	90.605	-0.130	0.000	3.705	13.6	OK
1.002	3	30	91.140	90.480	-0.130	0.000	0.202	14.8	OK
2.000	4	15	91.140	90.666	-0.104	0.000	0.046	3.3	OK
2.001	5	15	91.130	90.527	-0.098	0.000	0.077	4.5	OK
2.002	6	15	91.130	90.351	-0.084	0.000	0.099	6.7	OK
1.003	7	960	91.130	90.311	0.186	0.000	35.807	0.8	SURCHARGED

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	90.774	-0.131	0.000	3.716	13.2	OK
1.001	2	30	91.150	90.620	-0.115	0.000	4.586	17.6	OK
1.002	3	30	91.140	90.495	-0.115	0.000	0.251	19.1	OK
2.000	4	15	91.140	90.671	-0.099	0.000	0.052	4.2	OK
2.001	5	15	91.130	90.535	-0.090	0.000	0.089	5.7	OK
2.002	6	960	91.130	90.384	-0.051	0.000	0.151	0.9	OK
1.003	7	960	91.130	90.383	0.258	0.000	44.675	0.8	SURCHARGED

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	90.861	-0.044	0.000	9.082	33.3	OK
1.001	2	15	91.150	90.741	0.006	0.000	11.765	37.8	SURCHARGED
1.002	3	960	91.140	90.688	0.078	0.000	1.085	5.0	SURCHARGED
2.000	4	15	91.140	90.709	-0.061	0.000	0.095	10.2	OK
2.001	5	960	91.130	90.688	0.063	0.000	0.425	0.7	SURCHARGED
2.002	6	960	91.130	90.687	0.252	0.000	0.741	1.1	SURCHARGED
1.003	7	960	91.130	90.686	0.561	0.000	91.140	0.9	SURCHARGED

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	90.980	0.075	0.000	16.311	33.3	SURCHARGED
1.001	2	15	91.150	90.848	0.113	0.000	18.046	44.9	SURCHARGED
1.002	3	960	91.140	90.828	0.218	0.000	1.270	6.1	SURCHARGED
2.000	4	15	91.140	91.047	0.277	0.000	0.477	13.4	SURCHARGED
2.001	5	15	91.130	90.955	0.330	0.000	0.768	18.3	SURCHARGED
2.002	6	960	91.130	90.828	0.393	0.000	0.900	1.4	SURCHARGED
1.003	7	960	91.130	90.827	0.702	0.000	118.124	0.9	SURCHARGED

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	91.253	0.348	3.082	25.254	40.9	FLOOD
1.001	2	15	91.150	91.150	0.415	0.068	25.081	59.4	FLOOD
1.002	3	1440	91.140	91.050	0.440	0.000	1.520	5.0	SURCHARGED
2.000	4	15	91.140	91.142	0.372	2.123	2.705	18.1	FLOOD
2.001	5	15	91.130	91.125	0.500	0.000	0.960	20.1	SURCHARGED
2.002	6	1440	91.130	91.049	0.614	0.000	1.150	1.5	SURCHARGED
1.003	7	1440	91.130	91.048	0.923	0.000	168.870	1.0	SURCHARGED

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Surcharged Outfall Details for PHASE 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003		90.500	89.805	0.000	0	0

Datum (m) 90.030 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.050	37	0.050	73	0.050	109	0.050	145	0.050	181	0.050	217	0.050
2	0.050	38	0.050	74	0.050	110	0.050	146	0.050	182	0.050	218	0.050
3	0.050	39	0.050	75	0.050	111	0.050	147	0.050	183	0.050	219	0.050
4	0.050	40	0.050	76	0.050	112	0.050	148	0.050	184	0.050	220	0.050
5	0.050	41	0.050	77	0.050	113	0.050	149	0.050	185	0.050	221	0.050
6	0.050	42	0.050	78	0.050	114	0.050	150	0.050	186	0.050	222	0.050
7	0.050	43	0.050	79	0.050	115	0.050	151	0.050	187	0.050	223	0.050
8	0.050	44	0.050	80	0.050	116	0.050	152	0.050	188	0.050	224	0.050
9	0.050	45	0.050	81	0.050	117	0.050	153	0.050	189	0.050	225	0.050
10	0.050	46	0.050	82	0.050	118	0.050	154	0.050	190	0.050	226	0.050
11	0.050	47	0.050	83	0.050	119	0.050	155	0.050	191	0.050	227	0.050
12	0.050	48	0.050	84	0.050	120	0.050	156	0.050	192	0.050	228	0.050
13	0.050	49	0.050	85	0.050	121	0.050	157	0.050	193	0.050	229	0.050
14	0.050	50	0.050	86	0.050	122	0.050	158	0.050	194	0.050	230	0.050
15	0.050	51	0.050	87	0.050	123	0.050	159	0.050	195	0.050	231	0.050
16	0.050	52	0.050	88	0.050	124	0.050	160	0.050	196	0.050	232	0.050
17	0.050	53	0.050	89	0.050	125	0.050	161	0.050	197	0.050	233	0.050
18	0.050	54	0.050	90	0.050	126	0.050	162	0.050	198	0.050	234	0.050
19	0.050	55	0.050	91	0.050	127	0.050	163	0.050	199	0.050	235	0.050
20	0.050	56	0.050	92	0.050	128	0.050	164	0.050	200	0.050	236	0.050
21	0.050	57	0.050	93	0.050	129	0.050	165	0.050	201	0.050	237	0.050
22	0.050	58	0.050	94	0.050	130	0.050	166	0.050	202	0.050	238	0.050
23	0.050	59	0.050	95	0.050	131	0.050	167	0.050	203	0.050	239	0.050
24	0.050	60	0.050	96	0.050	132	0.050	168	0.050	204	0.050	240	0.050
25	0.050	61	0.050	97	0.050	133	0.050	169	0.050	205	0.050	241	0.050
26	0.050	62	0.050	98	0.050	134	0.050	170	0.050	206	0.050	242	0.050
27	0.050	63	0.050	99	0.050	135	0.050	171	0.050	207	0.050	243	0.050
28	0.050	64	0.050	100	0.050	136	0.050	172	0.050	208	0.050	244	0.050
29	0.050	65	0.050	101	0.050	137	0.050	173	0.050	209	0.050	245	0.050
30	0.050	66	0.050	102	0.050	138	0.050	174	0.050	210	0.050	246	0.050
31	0.050	67	0.050	103	0.050	139	0.050	175	0.050	211	0.050	247	0.050
32	0.050	68	0.050	104	0.050	140	0.050	176	0.050	212	0.050	248	0.050
33	0.050	69	0.050	105	0.050	141	0.050	177	0.050	213	0.050	249	0.050
34	0.050	70	0.050	106	0.050	142	0.050	178	0.050	214	0.050	250	0.050
35	0.050	71	0.050	107	0.050	143	0.050	179	0.050	215	0.050	251	0.050
36	0.050	72	0.050	108	0.050	144	0.050	180	0.050	216	0.050	252	0.050

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Surcharged Outfall Details for PHASE 1

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
253	0.050	298	0.050	343	0.050	388	0.050	433	0.050	478	0.050	523	0.050
254	0.050	299	0.050	344	0.050	389	0.050	434	0.050	479	0.050	524	0.050
255	0.050	300	0.050	345	0.050	390	0.050	435	0.050	480	0.050	525	0.050
256	0.050	301	0.050	346	0.050	391	0.050	436	0.050	481	0.050	526	0.050
257	0.050	302	0.050	347	0.050	392	0.050	437	0.050	482	0.050	527	0.050
258	0.050	303	0.050	348	0.050	393	0.050	438	0.050	483	0.050	528	0.050
259	0.050	304	0.050	349	0.050	394	0.050	439	0.050	484	0.050	529	0.050
260	0.050	305	0.050	350	0.050	395	0.050	440	0.050	485	0.050	530	0.050
261	0.050	306	0.050	351	0.050	396	0.050	441	0.050	486	0.050	531	0.050
262	0.050	307	0.050	352	0.050	397	0.050	442	0.050	487	0.050	532	0.050
263	0.050	308	0.050	353	0.050	398	0.050	443	0.050	488	0.050	533	0.050
264	0.050	309	0.050	354	0.050	399	0.050	444	0.050	489	0.050	534	0.050
265	0.050	310	0.050	355	0.050	400	0.050	445	0.050	490	0.050	535	0.050
266	0.050	311	0.050	356	0.050	401	0.050	446	0.050	491	0.050	536	0.050
267	0.050	312	0.050	357	0.050	402	0.050	447	0.050	492	0.050	537	0.050
268	0.050	313	0.050	358	0.050	403	0.050	448	0.050	493	0.050	538	0.050
269	0.050	314	0.050	359	0.050	404	0.050	449	0.050	494	0.050	539	0.050
270	0.050	315	0.050	360	0.050	405	0.050	450	0.050	495	0.050	540	0.050
271	0.050	316	0.050	361	0.050	406	0.050	451	0.050	496	0.050	541	0.050
272	0.050	317	0.050	362	0.050	407	0.050	452	0.050	497	0.050	542	0.050
273	0.050	318	0.050	363	0.050	408	0.050	453	0.050	498	0.050	543	0.050
274	0.050	319	0.050	364	0.050	409	0.050	454	0.050	499	0.050	544	0.050
275	0.050	320	0.050	365	0.050	410	0.050	455	0.050	500	0.050	545	0.050
276	0.050	321	0.050	366	0.050	411	0.050	456	0.050	501	0.050	546	0.050
277	0.050	322	0.050	367	0.050	412	0.050	457	0.050	502	0.050	547	0.050
278	0.050	323	0.050	368	0.050	413	0.050	458	0.050	503	0.050	548	0.050
279	0.050	324	0.050	369	0.050	414	0.050	459	0.050	504	0.050	549	0.050
280	0.050	325	0.050	370	0.050	415	0.050	460	0.050	505	0.050	550	0.050
281	0.050	326	0.050	371	0.050	416	0.050	461	0.050	506	0.050	551	0.050
282	0.050	327	0.050	372	0.050	417	0.050	462	0.050	507	0.050	552	0.050
283	0.050	328	0.050	373	0.050	418	0.050	463	0.050	508	0.050	553	0.050
284	0.050	329	0.050	374	0.050	419	0.050	464	0.050	509	0.050	554	0.050
285	0.050	330	0.050	375	0.050	420	0.050	465	0.050	510	0.050	555	0.050
286	0.050	331	0.050	376	0.050	421	0.050	466	0.050	511	0.050	556	0.050
287	0.050	332	0.050	377	0.050	422	0.050	467	0.050	512	0.050	557	0.050
288	0.050	333	0.050	378	0.050	423	0.050	468	0.050	513	0.050	558	0.050
289	0.050	334	0.050	379	0.050	424	0.050	469	0.050	514	0.050	559	0.050
290	0.050	335	0.050	380	0.050	425	0.050	470	0.050	515	0.050	560	0.050
291	0.050	336	0.050	381	0.050	426	0.050	471	0.050	516	0.050	561	0.050
292	0.050	337	0.050	382	0.050	427	0.050	472	0.050	517	0.050	562	0.050
293	0.050	338	0.050	383	0.050	428	0.050	473	0.050	518	0.050	563	0.050
294	0.050	339	0.050	384	0.050	429	0.050	474	0.050	519	0.050	564	0.050
295	0.050	340	0.050	385	0.050	430	0.050	475	0.050	520	0.050	565	0.050
296	0.050	341	0.050	386	0.050	431	0.050	476	0.050	521	0.050	566	0.050
297	0.050	342	0.050	387	0.050	432	0.050	477	0.050	522	0.050	567	0.050

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Surcharged Outfall Details for PHASE 1

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
568	0.050	613	0.050	658	0.050	703	0.050	748	0.050	793	0.050	838	0.050
569	0.050	614	0.050	659	0.050	704	0.050	749	0.050	794	0.050	839	0.050
570	0.050	615	0.050	660	0.050	705	0.050	750	0.050	795	0.050	840	0.050
571	0.050	616	0.050	661	0.050	706	0.050	751	0.050	796	0.050	841	0.050
572	0.050	617	0.050	662	0.050	707	0.050	752	0.050	797	0.050	842	0.050
573	0.050	618	0.050	663	0.050	708	0.050	753	0.050	798	0.050	843	0.050
574	0.050	619	0.050	664	0.050	709	0.050	754	0.050	799	0.050	844	0.050
575	0.050	620	0.050	665	0.050	710	0.050	755	0.050	800	0.050	845	0.050
576	0.050	621	0.050	666	0.050	711	0.050	756	0.050	801	0.050	846	0.050
577	0.050	622	0.050	667	0.050	712	0.050	757	0.050	802	0.050	847	0.050
578	0.050	623	0.050	668	0.050	713	0.050	758	0.050	803	0.050	848	0.050
579	0.050	624	0.050	669	0.050	714	0.050	759	0.050	804	0.050	849	0.050
580	0.050	625	0.050	670	0.050	715	0.050	760	0.050	805	0.050	850	0.050
581	0.050	626	0.050	671	0.050	716	0.050	761	0.050	806	0.050	851	0.050
582	0.050	627	0.050	672	0.050	717	0.050	762	0.050	807	0.050	852	0.050
583	0.050	628	0.050	673	0.050	718	0.050	763	0.050	808	0.050	853	0.050
584	0.050	629	0.050	674	0.050	719	0.050	764	0.050	809	0.050	854	0.050
585	0.050	630	0.050	675	0.050	720	0.050	765	0.050	810	0.050	855	0.050
586	0.050	631	0.050	676	0.050	721	0.050	766	0.050	811	0.050	856	0.050
587	0.050	632	0.050	677	0.050	722	0.050	767	0.050	812	0.050	857	0.050
588	0.050	633	0.050	678	0.050	723	0.050	768	0.050	813	0.050	858	0.050
589	0.050	634	0.050	679	0.050	724	0.050	769	0.050	814	0.050	859	0.050
590	0.050	635	0.050	680	0.050	725	0.050	770	0.050	815	0.050	860	0.050
591	0.050	636	0.050	681	0.050	726	0.050	771	0.050	816	0.050	861	0.050
592	0.050	637	0.050	682	0.050	727	0.050	772	0.050	817	0.050	862	0.050
593	0.050	638	0.050	683	0.050	728	0.050	773	0.050	818	0.050	863	0.050
594	0.050	639	0.050	684	0.050	729	0.050	774	0.050	819	0.050	864	0.050
595	0.050	640	0.050	685	0.050	730	0.050	775	0.050	820	0.050	865	0.050
596	0.050	641	0.050	686	0.050	731	0.050	776	0.050	821	0.050	866	0.050
597	0.050	642	0.050	687	0.050	732	0.050	777	0.050	822	0.050	867	0.050
598	0.050	643	0.050	688	0.050	733	0.050	778	0.050	823	0.050	868	0.050
599	0.050	644	0.050	689	0.050	734	0.050	779	0.050	824	0.050	869	0.050
600	0.050	645	0.050	690	0.050	735	0.050	780	0.050	825	0.050	870	0.050
601	0.050	646	0.050	691	0.050	736	0.050	781	0.050	826	0.050	871	0.050
602	0.050	647	0.050	692	0.050	737	0.050	782	0.050	827	0.050	872	0.050
603	0.050	648	0.050	693	0.050	738	0.050	783	0.050	828	0.050	873	0.050
604	0.050	649	0.050	694	0.050	739	0.050	784	0.050	829	0.050	874	0.050
605	0.050	650	0.050	695	0.050	740	0.050	785	0.050	830	0.050	875	0.050
606	0.050	651	0.050	696	0.050	741	0.050	786	0.050	831	0.050	876	0.050
607	0.050	652	0.050	697	0.050	742	0.050	787	0.050	832	0.050	877	0.050
608	0.050	653	0.050	698	0.050	743	0.050	788	0.050	833	0.050	878	0.050
609	0.050	654	0.050	699	0.050	744	0.050	789	0.050	834	0.050	879	0.050
610	0.050	655	0.050	700	0.050	745	0.050	790	0.050	835	0.050	880	0.050
611	0.050	656	0.050	701	0.050	746	0.050	791	0.050	836	0.050	881	0.050
612	0.050	657	0.050	702	0.050	747	0.050	792	0.050	837	0.050	882	0.050

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Surcharged Outfall Details for PHASE 1

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
883	0.050	928	0.050	973	0.050	1018	0.050	1063	0.050	1108	0.050	1153	0.050
884	0.050	929	0.050	974	0.050	1019	0.050	1064	0.050	1109	0.050	1154	0.050
885	0.050	930	0.050	975	0.050	1020	0.050	1065	0.050	1110	0.050	1155	0.050
886	0.050	931	0.050	976	0.050	1021	0.050	1066	0.050	1111	0.050	1156	0.050
887	0.050	932	0.050	977	0.050	1022	0.050	1067	0.050	1112	0.050	1157	0.050
888	0.050	933	0.050	978	0.050	1023	0.050	1068	0.050	1113	0.050	1158	0.050
889	0.050	934	0.050	979	0.050	1024	0.050	1069	0.050	1114	0.050	1159	0.050
890	0.050	935	0.050	980	0.050	1025	0.050	1070	0.050	1115	0.050	1160	0.050
891	0.050	936	0.050	981	0.050	1026	0.050	1071	0.050	1116	0.050	1161	0.050
892	0.050	937	0.050	982	0.050	1027	0.050	1072	0.050	1117	0.050	1162	0.050
893	0.050	938	0.050	983	0.050	1028	0.050	1073	0.050	1118	0.050	1163	0.050
894	0.050	939	0.050	984	0.050	1029	0.050	1074	0.050	1119	0.050	1164	0.050
895	0.050	940	0.050	985	0.050	1030	0.050	1075	0.050	1120	0.050	1165	0.050
896	0.050	941	0.050	986	0.050	1031	0.050	1076	0.050	1121	0.050	1166	0.050
897	0.050	942	0.050	987	0.050	1032	0.050	1077	0.050	1122	0.050	1167	0.050
898	0.050	943	0.050	988	0.050	1033	0.050	1078	0.050	1123	0.050	1168	0.050
899	0.050	944	0.050	989	0.050	1034	0.050	1079	0.050	1124	0.050	1169	0.050
900	0.050	945	0.050	990	0.050	1035	0.050	1080	0.050	1125	0.050	1170	0.050
901	0.050	946	0.050	991	0.050	1036	0.050	1081	0.050	1126	0.050	1171	0.050
902	0.050	947	0.050	992	0.050	1037	0.050	1082	0.050	1127	0.050	1172	0.050
903	0.050	948	0.050	993	0.050	1038	0.050	1083	0.050	1128	0.050	1173	0.050
904	0.050	949	0.050	994	0.050	1039	0.050	1084	0.050	1129	0.050	1174	0.050
905	0.050	950	0.050	995	0.050	1040	0.050	1085	0.050	1130	0.050	1175	0.050
906	0.050	951	0.050	996	0.050	1041	0.050	1086	0.050	1131	0.050	1176	0.050
907	0.050	952	0.050	997	0.050	1042	0.050	1087	0.050	1132	0.050	1177	0.050
908	0.050	953	0.050	998	0.050	1043	0.050	1088	0.050	1133	0.050	1178	0.050
909	0.050	954	0.050	999	0.050	1044	0.050	1089	0.050	1134	0.050	1179	0.050
910	0.050	955	0.050	1000	0.050	1045	0.050	1090	0.050	1135	0.050	1180	0.050
911	0.050	956	0.050	1001	0.050	1046	0.050	1091	0.050	1136	0.050	1181	0.050
912	0.050	957	0.050	1002	0.050	1047	0.050	1092	0.050	1137	0.050	1182	0.050
913	0.050	958	0.050	1003	0.050	1048	0.050	1093	0.050	1138	0.050	1183	0.050
914	0.050	959	0.050	1004	0.050	1049	0.050	1094	0.050	1139	0.050	1184	0.050
915	0.050	960	0.050	1005	0.050	1050	0.050	1095	0.050	1140	0.050	1185	0.050
916	0.050	961	0.050	1006	0.050	1051	0.050	1096	0.050	1141	0.050	1186	0.050
917	0.050	962	0.050	1007	0.050	1052	0.050	1097	0.050	1142	0.050	1187	0.050
918	0.050	963	0.050	1008	0.050	1053	0.050	1098	0.050	1143	0.050	1188	0.050
919	0.050	964	0.050	1009	0.050	1054	0.050	1099	0.050	1144	0.050	1189	0.050
920	0.050	965	0.050	1010	0.050	1055	0.050	1100	0.050	1145	0.050	1190	0.050
921	0.050	966	0.050	1011	0.050	1056	0.050	1101	0.050	1146	0.050	1191	0.050
922	0.050	967	0.050	1012	0.050	1057	0.050	1102	0.050	1147	0.050	1192	0.050
923	0.050	968	0.050	1013	0.050	1058	0.050	1103	0.050	1148	0.050	1193	0.050
924	0.050	969	0.050	1014	0.050	1059	0.050	1104	0.050	1149	0.050	1194	0.050
925	0.050	970	0.050	1015	0.050	1060	0.050	1105	0.050	1150	0.050	1195	0.050
926	0.050	971	0.050	1016	0.050	1061	0.050	1106	0.050	1151	0.050	1196	0.050
927	0.050	972	0.050	1017	0.050	1062	0.050	1107	0.050	1152	0.050	1197	0.050

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Surcharged Outfall Details for PHASE 1

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1198	0.050	1233	0.050	1268	0.050	1303	0.050	1338	0.050	1373	0.050	1408	0.050
1199	0.050	1234	0.050	1269	0.050	1304	0.050	1339	0.050	1374	0.050	1409	0.050
1200	0.050	1235	0.050	1270	0.050	1305	0.050	1340	0.050	1375	0.050	1410	0.050
1201	0.050	1236	0.050	1271	0.050	1306	0.050	1341	0.050	1376	0.050	1411	0.050
1202	0.050	1237	0.050	1272	0.050	1307	0.050	1342	0.050	1377	0.050	1412	0.050
1203	0.050	1238	0.050	1273	0.050	1308	0.050	1343	0.050	1378	0.050	1413	0.050
1204	0.050	1239	0.050	1274	0.050	1309	0.050	1344	0.050	1379	0.050	1414	0.050
1205	0.050	1240	0.050	1275	0.050	1310	0.050	1345	0.050	1380	0.050	1415	0.050
1206	0.050	1241	0.050	1276	0.050	1311	0.050	1346	0.050	1381	0.050	1416	0.050
1207	0.050	1242	0.050	1277	0.050	1312	0.050	1347	0.050	1382	0.050	1417	0.050
1208	0.050	1243	0.050	1278	0.050	1313	0.050	1348	0.050	1383	0.050	1418	0.050
1209	0.050	1244	0.050	1279	0.050	1314	0.050	1349	0.050	1384	0.050	1419	0.050
1210	0.050	1245	0.050	1280	0.050	1315	0.050	1350	0.050	1385	0.050	1420	0.050
1211	0.050	1246	0.050	1281	0.050	1316	0.050	1351	0.050	1386	0.050	1421	0.050
1212	0.050	1247	0.050	1282	0.050	1317	0.050	1352	0.050	1387	0.050	1422	0.050
1213	0.050	1248	0.050	1283	0.050	1318	0.050	1353	0.050	1388	0.050	1423	0.050
1214	0.050	1249	0.050	1284	0.050	1319	0.050	1354	0.050	1389	0.050	1424	0.050
1215	0.050	1250	0.050	1285	0.050	1320	0.050	1355	0.050	1390	0.050	1425	0.050
1216	0.050	1251	0.050	1286	0.050	1321	0.050	1356	0.050	1391	0.050	1426	0.050
1217	0.050	1252	0.050	1287	0.050	1322	0.050	1357	0.050	1392	0.050	1427	0.050
1218	0.050	1253	0.050	1288	0.050	1323	0.050	1358	0.050	1393	0.050	1428	0.050
1219	0.050	1254	0.050	1289	0.050	1324	0.050	1359	0.050	1394	0.050	1429	0.050
1220	0.050	1255	0.050	1290	0.050	1325	0.050	1360	0.050	1395	0.050	1430	0.050
1221	0.050	1256	0.050	1291	0.050	1326	0.050	1361	0.050	1396	0.050	1431	0.050
1222	0.050	1257	0.050	1292	0.050	1327	0.050	1362	0.050	1397	0.050	1432	0.050
1223	0.050	1258	0.050	1293	0.050	1328	0.050	1363	0.050	1398	0.050	1433	0.050
1224	0.050	1259	0.050	1294	0.050	1329	0.050	1364	0.050	1399	0.050	1434	0.050
1225	0.050	1260	0.050	1295	0.050	1330	0.050	1365	0.050	1400	0.050	1435	0.050
1226	0.050	1261	0.050	1296	0.050	1331	0.050	1366	0.050	1401	0.050	1436	0.050
1227	0.050	1262	0.050	1297	0.050	1332	0.050	1367	0.050	1402	0.050	1437	0.050
1228	0.050	1263	0.050	1298	0.050	1333	0.050	1368	0.050	1403	0.050	1438	0.050
1229	0.050	1264	0.050	1299	0.050	1334	0.050	1369	0.050	1404	0.050	1439	0.050
1230	0.050	1265	0.050	1300	0.050	1335	0.050	1370	0.050	1405	0.050	1440	0.050
1231	0.050	1266	0.050	1301	0.050	1336	0.050	1371	0.050	1406	0.050		
1232	0.050	1267	0.050	1302	0.050	1337	0.050	1372	0.050	1407	0.050		

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	90.980	0.075	0.000	16.311	33.3	SURCHARGED
1.001	2	1440	91.150	90.860	0.125	0.000	18.694	3.9	SURCHARGED
1.002	3	1440	91.140	90.858	0.248	0.000	1.304	4.1	SURCHARGED
2.000	4	15	91.140	91.047	0.277	0.000	0.477	13.4	SURCHARGED
2.001	5	15	91.130	90.955	0.330	0.000	0.768	18.3	SURCHARGED
2.002	6	1440	91.130	90.857	0.422	0.000	0.934	1.0	SURCHARGED
1.003	7	1440	91.130	90.857	0.732	0.000	124.362	0.9	SURCHARGED

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	1	15	91.250	91.253	0.348	3.082	25.254	40.9	FLOOD
1.001	2	15	91.150	91.150	0.415	0.068	25.081	59.4	FLOOD
1.002	3	1440	91.140	91.086	0.476	0.000	1.561	4.5	SURCHARGED
2.000	4	15	91.140	91.142	0.372	2.123	2.705	18.1	FLOOD
2.001	5	15	91.130	91.125	0.500	0.000	0.960	20.1	SURCHARGED
2.002	6	1440	91.130	91.085	0.650	0.000	1.191	1.5	SURCHARGED
1.003	7	1440	91.130	91.084	0.959	0.000	178.186	1.0	SURCHARGED

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Summary of Critical Results by Maximum Discharge Volume (Rank 1) for PHASE 1

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Discharge Vol (m³)	Status
1.003	7	360	91.130	35.214	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for PHASE 2

« - 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
S3.000	25.327	0.060	422.1	0.023	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	21.725	0.060	362.1	0.060	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.002	29.136	0.050	582.7	0.025	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.003	17.727	0.040	443.2	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.004	28.273	0.060	471.2	0.109	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.005	22.922	0.050	458.4	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.000	21.472	0.050	429.4	0.055	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	31.576	0.115	274.6	0.064	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.006	14.532	0.040	363.3	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.007	20.124	0.050	402.5	0.016	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.008	8.035	0.035	229.6	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.000	14.722	0.070	210.3	0.077	5.00	0.0	0.600	o	225	Pipe/Conduit	
S5.001	20.677	0.050	413.5	0.002	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)
S3.000	65.28	5.87	90.440	0.023	0.0	0.0	0.0	0.48	8.5	4.1
S3.001	61.97	6.57	90.380	0.084	0.0	0.0	0.0	0.52	9.2«	14.1
S3.002	57.11	7.75	90.320	0.109	0.0	0.0	0.0	0.41	7.2«	16.8
S3.003	55.38	8.23	90.195	0.135	0.0	0.0	0.0	0.61	24.4	20.3
S3.004	53.21	8.89	90.080	0.244	0.0	0.0	0.0	0.72	50.7	35.2
S3.005	51.63	9.42	90.020	0.276	0.0	0.0	0.0	0.73	51.4	38.6
S4.000	66.85	5.57	90.210	0.055	0.0	0.0	0.0	0.62	24.8	10.0
S4.001	63.46	6.24	90.160	0.119	0.0	0.0	0.0	0.78	31.2	20.5
S3.006	50.80	9.71	89.970	0.414	0.0	0.0	0.0	0.82	57.9	57.0
S3.007	49.63	10.14	89.930	0.431	0.0	0.0	0.0	0.78	55.0«	57.9
S3.008	49.29	10.27	89.880	0.464	0.0	0.0	0.0	1.03	73.1	62.0
S5.000	68.50	5.27	90.260	0.077	0.0	0.0	0.0	0.90	35.7	14.3
S5.001	65.58	5.81	90.190	0.079	0.0	0.0	0.0	0.64	25.3	14.3

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for PHASE 2

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
S6.000	22.046	0.050	440.9	0.025	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.002	28.062	0.050	561.2	0.070	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.003	7.667	0.035	219.1	0.045	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.009	20.032	0.085	235.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S6.000	65.77	5.78	90.100	0.025	0.0	0.0	0.0	0.47	8.3	4.5
S5.002	62.15	6.53	89.900	0.174	0.0	0.0	0.0	0.66	46.4	29.2
S5.003	61.61	6.65	89.850	0.219	0.0	0.0	0.0	1.06	74.8	36.5
S3.009	48.46	10.60	89.560	0.683	0.0	0.0	0.0	1.02	72.1«	89.7

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PIPELINE SCHEDULES for PHASE 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.000	o	150	S8	90.950	90.440	0.360	Open Manhole	1200
S3.001	o	150	S9	90.890	90.380	0.360	Open Manhole	1200
S3.002	o	150	S10	90.830	90.320	0.360	Open Manhole	1200
S3.003	o	225	S11	90.780	90.195	0.360	Open Manhole	1200
S3.004	o	300	S12	90.740	90.080	0.360	Open Manhole	1200
S3.005	o	300	S13	90.680	90.020	0.360	Open Manhole	1200
S4.000	o	225	S14	90.690	90.210	0.255	Open Manhole	1200
S4.001	o	225	S15	90.640	90.160	0.255	Open Manhole	1200
S3.006	o	300	S16	90.630	89.970	0.360	Open Manhole	1200
S3.007	o	300	S17	90.590	89.930	0.360	Open Manhole	1200
S3.008	o	300	S18	90.560	89.880	0.380	Open Manhole	1200
S5.000	o	225	S19	90.780	90.260	0.295	Open Manhole	1200
S5.001	o	225	S20	90.710	90.190	0.295	Open Manhole	1200
S6.000	o	150	S21	90.660	90.100	0.410	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.000	25.327	422.1	S9	90.890	90.380	0.360	Open Manhole	1200
S3.001	21.725	362.1	S10	90.830	90.320	0.360	Open Manhole	1200
S3.002	29.136	582.7	S11	90.780	90.270	0.360	Open Manhole	1200
S3.003	17.727	443.2	S12	90.740	90.155	0.360	Open Manhole	1200
S3.004	28.273	471.2	S13	90.680	90.020	0.360	Open Manhole	1200
S3.005	22.922	458.4	S16	90.630	89.970	0.360	Open Manhole	1200
S4.000	21.472	429.4	S15	90.640	90.160	0.255	Open Manhole	1200
S4.001	31.576	274.6	S16	90.630	90.045	0.360	Open Manhole	1200
S3.006	14.532	363.3	S17	90.590	89.930	0.360	Open Manhole	1200
S3.007	20.124	402.5	S18	90.560	89.880	0.380	Open Manhole	1200
S3.008	8.035	229.6	S24	90.540	89.845	0.395	Open Manhole	1200
S5.000	14.722	210.3	S20	90.710	90.190	0.295	Open Manhole	1200
S5.001	20.677	413.5	S22	90.660	90.140	0.295	Open Manhole	1200
S6.000	22.046	440.9	S22	90.660	90.050	0.460	Open Manhole	1200

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PIPELINE SCHEDULES for PHASE 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S5.002	o	300	S22	90.660	89.900	0.460	Open Manhole	1200
S5.003	o	300	S23	90.550	89.850	0.400	Open Manhole	1200
S3.009	o	300	S24	90.540	89.560	0.680	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S5.002	28.062	561.2	S23	90.550	89.850	0.400	Open Manhole	1200
S5.003	7.667	219.1	S24	90.540	89.815	0.425	Open Manhole	1200
S3.009	20.032	235.7	S	90.500	89.475	0.725	Open Manhole	0

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Online Controls for PHASE 2

Orifice Manhole: S12, DS/PN: S3.004, Volume (m³): 1.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 90.080

Orifice Manhole: S15, DS/PN: S4.001, Volume (m³): 1.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 90.160

Orifice Manhole: S20, DS/PN: S5.001, Volume (m³): 1.1

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 90.190

Orifice Manhole: S22, DS/PN: S5.002, Volume (m³): 2.0

Diameter (m) 0.080 Discharge Coefficient 0.600 Invert Level (m) 89.900

Hydro-Brake® Optimum Manhole: S24, DS/PN: S3.009, Volume (m³): 2.0

Unit Reference	MD-SHE-0052-1200-0980-1200
Design Head (m)	0.980
Design Flow (l/s)	1.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	52
Invert Level (m)	89.560
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.980	1.2	Kick-Flo®	0.461	0.9
Flush-Flo™	0.228	1.0	Mean Flow over Head Range	-	1.0

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	0.9	0.500	0.9	1.200	1.3	2.000	1.7
0.200	1.0	0.600	1.0	1.400	1.4	2.200	1.7
0.300	1.0	0.800	1.1	1.600	1.5	2.400	1.8
0.400	1.0	1.000	1.2	1.800	1.6	2.600	1.9

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Hydro-Brake® Optimum Manhole: S24, DS/PN: S3.009, Volume (m³): 2.0

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
3.000	2.0	5.000	2.5	7.000	2.9	9.000	3.3
3.500	2.1	5.500	2.6	7.500	3.0	9.500	3.4
4.000	2.3	6.000	2.7	8.000	3.1		
4.500	2.4	6.500	2.8	8.500	3.2		

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Storage Structures for PHASE 2

Porous Car Park Manhole: S8, DS/PN: S3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	18.0
Max Percolation (l/s)	50.0	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.440	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: S9, DS/PN: S3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	49.0
Max Percolation (l/s)	136.1	Slope (1:X)	195.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.380	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: S10, DS/PN: S3.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	86.1	Slope (1:X)	310.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.320	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: S11, DS/PN: S3.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.0
Max Percolation (l/s)	58.3	Slope (1:X)	582.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.195	Cap Volume Depth (m)	0.370

Porous Car Park Manhole: S12, DS/PN: S3.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	85.0
Max Percolation (l/s)	236.1	Slope (1:X)	443.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.080	Cap Volume Depth (m)	0.450

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Porous Car Park Manhole: S13, DS/PN: S3.005

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	23.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	63.9	Slope (1:X)	471.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.020	Cap Volume Depth (m)	0.450

Porous Car Park Manhole: S14, DS/PN: S4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	69.4	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.210	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S15, DS/PN: S4.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	40.0
Max Percolation (l/s)	111.1	Slope (1:X)	357.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.160	Cap Volume Depth (m)	0.380

Porous Car Park Manhole: S16, DS/PN: S3.006

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	55.6	Slope (1:X)	458.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.970	Cap Volume Depth (m)	0.450

Porous Car Park Manhole: S17, DS/PN: S3.007

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	22.2	Slope (1:X)	363.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.930	Cap Volume Depth (m)	0.420

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Porous Car Park Manhole: S18, DS/PN: S3.008

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	22.0
Max Percolation (l/s)	61.1	Slope (1:X)	287.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.880	Cap Volume Depth (m)	0.470

Porous Car Park Manhole: S19, DS/PN: S5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	138.9	Slope (1:X)	210.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.260	Cap Volume Depth (m)	0.410

Porous Car Park Manhole: S20, DS/PN: S5.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	25.0	Slope (1:X)	210.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.190	Cap Volume Depth (m)	0.410

Porous Car Park Manhole: S21, DS/PN: S6.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	25.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.090	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S22, DS/PN: S5.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	26.0
Max Percolation (l/s)	72.2	Slope (1:X)	413.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.900	Cap Volume Depth (m)	0.500

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Porous Car Park Manhole: S23, DS/PN: S5.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	86.1	Slope (1:X)	561.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.850	Cap Volume Depth (m)	0.490

Tank or Pond Manhole: S24, DS/PN: S3.009

Invert Level (m) 89.560

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	148.0	0.980	348.0

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	60	90.950	90.480	-0.110	0.000	0.518	1.3	OK
S3.001	S9	60	90.890	90.449	-0.081	0.000	1.590	3.8	OK
S3.002	S10	180	90.830	90.393	-0.077	0.000	2.680	3.3	OK
S3.003	S11	240	90.780	90.257	-0.163	0.000	2.845	3.5	OK
S3.004	S12	600	90.740	90.238	-0.142	0.000	16.988	1.9	OK
S3.005	S13	480	90.680	90.069	-0.251	0.000	2.851	2.2	OK

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	240	90.690	90.270	-0.165	0.000	1.689	1.6	OK
S4.001	S15	240	90.640	90.268	-0.117	0.000	6.629	1.5	OK
S3.006	S16	2880	90.630	90.037	-0.233	0.000	2.956	2.8	OK
S3.007	S17	2880	90.590	90.036	-0.194	0.000	2.514	2.9	OK
S3.008	S18	2880	90.560	90.036	-0.144	0.000	8.443	3.1	OK
S5.000	S19	30	90.780	90.324	-0.161	0.000	1.373	5.7	OK
S5.001	S20	180	90.710	90.312	-0.103	0.000	2.950	1.6	OK
S6.000	S21	60	90.660	90.142	-0.108	0.000	1.007	1.4	OK
S5.002	S22	2880	90.660	90.069	-0.131	0.000	10.939	1.4	OK
S5.003	S23	2880	90.550	90.036	-0.114	0.000	15.863	1.6	OK
S3.009	S24	2880	90.540	90.036	0.176	0.000	91.243	1.0	SURCHARGED

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	60	90.950	90.487	-0.103	0.000	0.715	1.6	OK
S3.001	S9	60	90.890	90.462	-0.068	0.000	2.188	5.0	OK
S3.002	S10	120	90.830	90.405	-0.065	0.000	3.544	4.2	OK
S3.003	S11	240	90.780	90.268	-0.152	0.000	3.526	4.2	OK
S3.004	S12	480	90.740	90.260	-0.120	0.000	21.974	2.1	OK
S3.005	S13	2880	90.680	90.083	-0.237	0.000	3.858	1.9	OK

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	240	90.690	90.283	-0.152	0.000	2.496	1.8	OK
S4.001	S15	240	90.640	90.282	-0.103	0.000	8.319	1.6	OK
S3.006	S16	2880	90.630	90.082	-0.188	0.000	5.896	3.1	OK
S3.007	S17	2880	90.590	90.082	-0.148	0.000	3.825	3.2	OK
S3.008	S18	2880	90.560	90.081	-0.099	0.000	11.727	3.3	OK
S5.000	S19	30	90.780	90.337	-0.148	0.000	1.928	7.9	OK
S5.001	S20	120	90.710	90.331	-0.084	0.000	3.558	1.8	OK
S6.000	S21	30	90.660	90.150	-0.100	0.000	1.236	1.9	OK
S5.002	S22	2880	90.660	90.116	-0.084	0.000	14.729	1.4	OK
S5.003	S23	2880	90.550	90.081	-0.069	0.000	20.428	1.7	OK
S3.009	S24	2880	90.540	90.081	0.221	0.000	102.273	1.0	SURCHARGED

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	30	90.950	90.541	-0.049	0.000	3.153	3.2	OK
S3.001	S9	30	90.890	90.530	0.000	0.000	7.019	8.7	OK
S3.002	S10	120	90.830	90.467	-0.003	0.000	9.410	6.9	OK
S3.003	S11	360	90.780	90.383	-0.037	0.000	11.210	5.9	OK
S3.004	S12	360	90.740	90.380	0.000	0.000	52.928	2.7	OK
S3.005	S13	2880	90.680	90.265	-0.055	0.000	17.867	2.0	OK

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	180	90.690	90.369	-0.066	0.000	8.984	2.5	OK
S4.001	S15	180	90.640	90.367	-0.018	0.000	19.005	2.2	OK
S3.006	S16	2880	90.630	90.265	-0.005	0.000	18.983	3.2	OK
S3.007	S17	2880	90.590	90.264	0.034	0.000	8.969	3.2	SURCHARGED
S3.008	S18	2880	90.560	90.264	0.084	0.000	24.536	2.9	SURCHARGED
S5.000	S19	120	90.780	90.427	-0.058	0.000	8.932	6.1	OK
S5.001	S20	120	90.710	90.422	0.007	0.000	6.342	2.4	SURCHARGED
S6.000	S21	2880	90.660	90.270	0.020	0.000	4.613	0.3	SURCHARGED
S5.002	S22	2880	90.660	90.270	0.070	0.000	27.531	1.7	SURCHARGED
S5.003	S23	2880	90.550	90.263	0.113	0.000	38.233	1.4	SURCHARGED
S3.009	S24	2880	90.540	90.263	0.403	0.000	150.714	1.0	SURCHARGED

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	30	90.950	90.586	-0.004	0.000	5.632	3.1	OK
S3.001	S9	15	90.890	90.572	0.042	0.000	11.338	11.7	SURCHARGED
S3.002	S10	60	90.830	90.499	0.029	0.000	12.483	9.1	SURCHARGED
S3.003	S11	360	90.780	90.472	0.052	0.000	17.082	5.9	SURCHARGED
S3.004	S12	360	90.740	90.470	0.090	0.000	75.986	2.6	SURCHARGED
S3.005	S13	2880	90.680	90.372	0.052	0.000	25.816	2.1	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	120	90.690	90.443	0.008	0.000	14.601	2.9	SURCHARGED
S4.001	S15	120	90.640	90.440	0.055	0.000	27.981	2.6	SURCHARGED
S3.006	S16	2880	90.630	90.372	0.102	0.000	25.986	3.3	SURCHARGED
S3.007	S17	2880	90.590	90.372	0.142	0.000	11.502	3.3	SURCHARGED
S3.008	S18	2880	90.560	90.371	0.191	0.000	31.562	3.0	SURCHARGED
S5.000	S19	120	90.780	90.494	0.009	0.000	17.548	5.1	SURCHARGED
S5.001	S20	120	90.710	90.491	0.076	0.000	8.349	2.3	SURCHARGED
S6.000	S21	2880	90.660	90.378	0.128	0.000	7.660	0.4	SURCHARGED
S5.002	S22	2880	90.660	90.379	0.179	0.000	36.470	2.1	SURCHARGED
S5.003	S23	2880	90.550	90.370	0.220	0.000	47.530	1.7	SURCHARGED
S3.009	S24	2880	90.540	90.370	0.510	0.000	182.401	1.1	SURCHARGED

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	30	90.950	90.640	0.050	0.000	8.576	3.4	SURCHARGED
S3.001	S9	30	90.890	90.621	0.091	0.000	17.688	12.9	SURCHARGED
S3.002	S10	2880	90.830	90.590	0.120	0.000	21.142	2.0	SURCHARGED
S3.003	S11	2880	90.780	90.589	0.169	0.000	24.118	1.9	SURCHARGED
S3.004	S12	2880	90.740	90.589	0.209	0.000	104.176	2.0	SURCHARGED
S3.005	S13	2880	90.680	90.556	0.236	0.000	33.565	2.1	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	2880	90.690	90.575	0.140	0.000	24.557	0.8	SURCHARGED
S4.001	S15	2880	90.640	90.575	0.190	0.000	43.694	1.5	SURCHARGED
S3.006	S16	2880	90.630	90.556	0.286	0.000	30.400	3.3	SURCHARGED
S3.007	S17	2880	90.590	90.555	0.325	0.000	11.724	3.3	SURCHARGED
S3.008	S18	2880	90.560	90.554	0.374	0.000	33.114	3.0	SURCHARGED
S5.000	S19	2880	90.780	90.575	0.090	0.000	29.738	1.2	SURCHARGED
S5.001	S20	2880	90.710	90.575	0.160	0.000	10.711	1.1	SURCHARGED
S6.000	S21	2880	90.660	90.564	0.314	0.000	9.980	0.4	SURCHARGED
S5.002	S22	2880	90.660	90.564	0.364	0.000	40.888	2.4	SURCHARGED
S5.003	S23	2880	90.550	90.554	0.404	3.826	52.081	1.9	FLOOD
S3.009	S24	2880	90.540	90.554	0.694	4.743	242.948	1.2	FLOOD

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Surcharged Outfall Details for PHASE 2

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S3.009	S	90.500	89.475	0.000	0	0

Datum (m) 89.775 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.305	37	0.305	73	0.305	109	0.305	145	0.305	181	0.305	217	0.305
2	0.305	38	0.305	74	0.305	110	0.305	146	0.305	182	0.305	218	0.305
3	0.305	39	0.305	75	0.305	111	0.305	147	0.305	183	0.305	219	0.305
4	0.305	40	0.305	76	0.305	112	0.305	148	0.305	184	0.305	220	0.305
5	0.305	41	0.305	77	0.305	113	0.305	149	0.305	185	0.305	221	0.305
6	0.305	42	0.305	78	0.305	114	0.305	150	0.305	186	0.305	222	0.305
7	0.305	43	0.305	79	0.305	115	0.305	151	0.305	187	0.305	223	0.305
8	0.305	44	0.305	80	0.305	116	0.305	152	0.305	188	0.305	224	0.305
9	0.305	45	0.305	81	0.305	117	0.305	153	0.305	189	0.305	225	0.305
10	0.305	46	0.305	82	0.305	118	0.305	154	0.305	190	0.305	226	0.305
11	0.305	47	0.305	83	0.305	119	0.305	155	0.305	191	0.305	227	0.305
12	0.305	48	0.305	84	0.305	120	0.305	156	0.305	192	0.305	228	0.305
13	0.305	49	0.305	85	0.305	121	0.305	157	0.305	193	0.305	229	0.305
14	0.305	50	0.305	86	0.305	122	0.305	158	0.305	194	0.305	230	0.305
15	0.305	51	0.305	87	0.305	123	0.305	159	0.305	195	0.305	231	0.305
16	0.305	52	0.305	88	0.305	124	0.305	160	0.305	196	0.305	232	0.305
17	0.305	53	0.305	89	0.305	125	0.305	161	0.305	197	0.305	233	0.305
18	0.305	54	0.305	90	0.305	126	0.305	162	0.305	198	0.305	234	0.305
19	0.305	55	0.305	91	0.305	127	0.305	163	0.305	199	0.305	235	0.305
20	0.305	56	0.305	92	0.305	128	0.305	164	0.305	200	0.305	236	0.305
21	0.305	57	0.305	93	0.305	129	0.305	165	0.305	201	0.305	237	0.305
22	0.305	58	0.305	94	0.305	130	0.305	166	0.305	202	0.305	238	0.305
23	0.305	59	0.305	95	0.305	131	0.305	167	0.305	203	0.305	239	0.305
24	0.305	60	0.305	96	0.305	132	0.305	168	0.305	204	0.305	240	0.305
25	0.305	61	0.305	97	0.305	133	0.305	169	0.305	205	0.305	241	0.305
26	0.305	62	0.305	98	0.305	134	0.305	170	0.305	206	0.305	242	0.305
27	0.305	63	0.305	99	0.305	135	0.305	171	0.305	207	0.305	243	0.305
28	0.305	64	0.305	100	0.305	136	0.305	172	0.305	208	0.305	244	0.305
29	0.305	65	0.305	101	0.305	137	0.305	173	0.305	209	0.305	245	0.305
30	0.305	66	0.305	102	0.305	138	0.305	174	0.305	210	0.305	246	0.305
31	0.305	67	0.305	103	0.305	139	0.305	175	0.305	211	0.305	247	0.305
32	0.305	68	0.305	104	0.305	140	0.305	176	0.305	212	0.305	248	0.305
33	0.305	69	0.305	105	0.305	141	0.305	177	0.305	213	0.305	249	0.305
34	0.305	70	0.305	106	0.305	142	0.305	178	0.305	214	0.305	250	0.305
35	0.305	71	0.305	107	0.305	143	0.305	179	0.305	215	0.305	251	0.305
36	0.305	72	0.305	108	0.305	144	0.305	180	0.305	216	0.305	252	0.305

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Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
253	0.305	298	0.305	343	0.305	388	0.305	433	0.305	478	0.305	523	0.305
254	0.305	299	0.305	344	0.305	389	0.305	434	0.305	479	0.305	524	0.305
255	0.305	300	0.305	345	0.305	390	0.305	435	0.305	480	0.305	525	0.305
256	0.305	301	0.305	346	0.305	391	0.305	436	0.305	481	0.305	526	0.305
257	0.305	302	0.305	347	0.305	392	0.305	437	0.305	482	0.305	527	0.305
258	0.305	303	0.305	348	0.305	393	0.305	438	0.305	483	0.305	528	0.305
259	0.305	304	0.305	349	0.305	394	0.305	439	0.305	484	0.305	529	0.305
260	0.305	305	0.305	350	0.305	395	0.305	440	0.305	485	0.305	530	0.305
261	0.305	306	0.305	351	0.305	396	0.305	441	0.305	486	0.305	531	0.305
262	0.305	307	0.305	352	0.305	397	0.305	442	0.305	487	0.305	532	0.305
263	0.305	308	0.305	353	0.305	398	0.305	443	0.305	488	0.305	533	0.305
264	0.305	309	0.305	354	0.305	399	0.305	444	0.305	489	0.305	534	0.305
265	0.305	310	0.305	355	0.305	400	0.305	445	0.305	490	0.305	535	0.305
266	0.305	311	0.305	356	0.305	401	0.305	446	0.305	491	0.305	536	0.305
267	0.305	312	0.305	357	0.305	402	0.305	447	0.305	492	0.305	537	0.305
268	0.305	313	0.305	358	0.305	403	0.305	448	0.305	493	0.305	538	0.305
269	0.305	314	0.305	359	0.305	404	0.305	449	0.305	494	0.305	539	0.305
270	0.305	315	0.305	360	0.305	405	0.305	450	0.305	495	0.305	540	0.305
271	0.305	316	0.305	361	0.305	406	0.305	451	0.305	496	0.305	541	0.305
272	0.305	317	0.305	362	0.305	407	0.305	452	0.305	497	0.305	542	0.305
273	0.305	318	0.305	363	0.305	408	0.305	453	0.305	498	0.305	543	0.305
274	0.305	319	0.305	364	0.305	409	0.305	454	0.305	499	0.305	544	0.305
275	0.305	320	0.305	365	0.305	410	0.305	455	0.305	500	0.305	545	0.305
276	0.305	321	0.305	366	0.305	411	0.305	456	0.305	501	0.305	546	0.305
277	0.305	322	0.305	367	0.305	412	0.305	457	0.305	502	0.305	547	0.305
278	0.305	323	0.305	368	0.305	413	0.305	458	0.305	503	0.305	548	0.305
279	0.305	324	0.305	369	0.305	414	0.305	459	0.305	504	0.305	549	0.305
280	0.305	325	0.305	370	0.305	415	0.305	460	0.305	505	0.305	550	0.305
281	0.305	326	0.305	371	0.305	416	0.305	461	0.305	506	0.305	551	0.305
282	0.305	327	0.305	372	0.305	417	0.305	462	0.305	507	0.305	552	0.305
283	0.305	328	0.305	373	0.305	418	0.305	463	0.305	508	0.305	553	0.305
284	0.305	329	0.305	374	0.305	419	0.305	464	0.305	509	0.305	554	0.305
285	0.305	330	0.305	375	0.305	420	0.305	465	0.305	510	0.305	555	0.305
286	0.305	331	0.305	376	0.305	421	0.305	466	0.305	511	0.305	556	0.305
287	0.305	332	0.305	377	0.305	422	0.305	467	0.305	512	0.305	557	0.305
288	0.305	333	0.305	378	0.305	423	0.305	468	0.305	513	0.305	558	0.305
289	0.305	334	0.305	379	0.305	424	0.305	469	0.305	514	0.305	559	0.305
290	0.305	335	0.305	380	0.305	425	0.305	470	0.305	515	0.305	560	0.305
291	0.305	336	0.305	381	0.305	426	0.305	471	0.305	516	0.305	561	0.305
292	0.305	337	0.305	382	0.305	427	0.305	472	0.305	517	0.305	562	0.305
293	0.305	338	0.305	383	0.305	428	0.305	473	0.305	518	0.305	563	0.305
294	0.305	339	0.305	384	0.305	429	0.305	474	0.305	519	0.305	564	0.305
295	0.305	340	0.305	385	0.305	430	0.305	475	0.305	520	0.305	565	0.305
296	0.305	341	0.305	386	0.305	431	0.305	476	0.305	521	0.305	566	0.305
297	0.305	342	0.305	387	0.305	432	0.305	477	0.305	522	0.305	567	0.305

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568	0.305	613	0.305	658	0.305	703	0.305	748	0.305	793	0.305	838	0.305
569	0.305	614	0.305	659	0.305	704	0.305	749	0.305	794	0.305	839	0.305
570	0.305	615	0.305	660	0.305	705	0.305	750	0.305	795	0.305	840	0.305
571	0.305	616	0.305	661	0.305	706	0.305	751	0.305	796	0.305	841	0.305
572	0.305	617	0.305	662	0.305	707	0.305	752	0.305	797	0.305	842	0.305
573	0.305	618	0.305	663	0.305	708	0.305	753	0.305	798	0.305	843	0.305
574	0.305	619	0.305	664	0.305	709	0.305	754	0.305	799	0.305	844	0.305
575	0.305	620	0.305	665	0.305	710	0.305	755	0.305	800	0.305	845	0.305
576	0.305	621	0.305	666	0.305	711	0.305	756	0.305	801	0.305	846	0.305
577	0.305	622	0.305	667	0.305	712	0.305	757	0.305	802	0.305	847	0.305
578	0.305	623	0.305	668	0.305	713	0.305	758	0.305	803	0.305	848	0.305
579	0.305	624	0.305	669	0.305	714	0.305	759	0.305	804	0.305	849	0.305
580	0.305	625	0.305	670	0.305	715	0.305	760	0.305	805	0.305	850	0.305
581	0.305	626	0.305	671	0.305	716	0.305	761	0.305	806	0.305	851	0.305
582	0.305	627	0.305	672	0.305	717	0.305	762	0.305	807	0.305	852	0.305
583	0.305	628	0.305	673	0.305	718	0.305	763	0.305	808	0.305	853	0.305
584	0.305	629	0.305	674	0.305	719	0.305	764	0.305	809	0.305	854	0.305
585	0.305	630	0.305	675	0.305	720	0.305	765	0.305	810	0.305	855	0.305
586	0.305	631	0.305	676	0.305	721	0.305	766	0.305	811	0.305	856	0.305
587	0.305	632	0.305	677	0.305	722	0.305	767	0.305	812	0.305	857	0.305
588	0.305	633	0.305	678	0.305	723	0.305	768	0.305	813	0.305	858	0.305
589	0.305	634	0.305	679	0.305	724	0.305	769	0.305	814	0.305	859	0.305
590	0.305	635	0.305	680	0.305	725	0.305	770	0.305	815	0.305	860	0.305
591	0.305	636	0.305	681	0.305	726	0.305	771	0.305	816	0.305	861	0.305
592	0.305	637	0.305	682	0.305	727	0.305	772	0.305	817	0.305	862	0.305
593	0.305	638	0.305	683	0.305	728	0.305	773	0.305	818	0.305	863	0.305
594	0.305	639	0.305	684	0.305	729	0.305	774	0.305	819	0.305	864	0.305
595	0.305	640	0.305	685	0.305	730	0.305	775	0.305	820	0.305	865	0.305
596	0.305	641	0.305	686	0.305	731	0.305	776	0.305	821	0.305	866	0.305
597	0.305	642	0.305	687	0.305	732	0.305	777	0.305	822	0.305	867	0.305
598	0.305	643	0.305	688	0.305	733	0.305	778	0.305	823	0.305	868	0.305
599	0.305	644	0.305	689	0.305	734	0.305	779	0.305	824	0.305	869	0.305
600	0.305	645	0.305	690	0.305	735	0.305	780	0.305	825	0.305	870	0.305
601	0.305	646	0.305	691	0.305	736	0.305	781	0.305	826	0.305	871	0.305
602	0.305	647	0.305	692	0.305	737	0.305	782	0.305	827	0.305	872	0.305
603	0.305	648	0.305	693	0.305	738	0.305	783	0.305	828	0.305	873	0.305
604	0.305	649	0.305	694	0.305	739	0.305	784	0.305	829	0.305	874	0.305
605	0.305	650	0.305	695	0.305	740	0.305	785	0.305	830	0.305	875	0.305
606	0.305	651	0.305	696	0.305	741	0.305	786	0.305	831	0.305	876	0.305
607	0.305	652	0.305	697	0.305	742	0.305	787	0.305	832	0.305	877	0.305
608	0.305	653	0.305	698	0.305	743	0.305	788	0.305	833	0.305	878	0.305
609	0.305	654	0.305	699	0.305	744	0.305	789	0.305	834	0.305	879	0.305
610	0.305	655	0.305	700	0.305	745	0.305	790	0.305	835	0.305	880	0.305
611	0.305	656	0.305	701	0.305	746	0.305	791	0.305	836	0.305	881	0.305
612	0.305	657	0.305	702	0.305	747	0.305	792	0.305	837	0.305	882	0.305

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883	0.305	928	0.305	973	0.305	1018	0.305	1063	0.305	1108	0.305	1153	0.305
884	0.305	929	0.305	974	0.305	1019	0.305	1064	0.305	1109	0.305	1154	0.305
885	0.305	930	0.305	975	0.305	1020	0.305	1065	0.305	1110	0.305	1155	0.305
886	0.305	931	0.305	976	0.305	1021	0.305	1066	0.305	1111	0.305	1156	0.305
887	0.305	932	0.305	977	0.305	1022	0.305	1067	0.305	1112	0.305	1157	0.305
888	0.305	933	0.305	978	0.305	1023	0.305	1068	0.305	1113	0.305	1158	0.305
889	0.305	934	0.305	979	0.305	1024	0.305	1069	0.305	1114	0.305	1159	0.305
890	0.305	935	0.305	980	0.305	1025	0.305	1070	0.305	1115	0.305	1160	0.305
891	0.305	936	0.305	981	0.305	1026	0.305	1071	0.305	1116	0.305	1161	0.305
892	0.305	937	0.305	982	0.305	1027	0.305	1072	0.305	1117	0.305	1162	0.305
893	0.305	938	0.305	983	0.305	1028	0.305	1073	0.305	1118	0.305	1163	0.305
894	0.305	939	0.305	984	0.305	1029	0.305	1074	0.305	1119	0.305	1164	0.305
895	0.305	940	0.305	985	0.305	1030	0.305	1075	0.305	1120	0.305	1165	0.305
896	0.305	941	0.305	986	0.305	1031	0.305	1076	0.305	1121	0.305	1166	0.305
897	0.305	942	0.305	987	0.305	1032	0.305	1077	0.305	1122	0.305	1167	0.305
898	0.305	943	0.305	988	0.305	1033	0.305	1078	0.305	1123	0.305	1168	0.305
899	0.305	944	0.305	989	0.305	1034	0.305	1079	0.305	1124	0.305	1169	0.305
900	0.305	945	0.305	990	0.305	1035	0.305	1080	0.305	1125	0.305	1170	0.305
901	0.305	946	0.305	991	0.305	1036	0.305	1081	0.305	1126	0.305	1171	0.305
902	0.305	947	0.305	992	0.305	1037	0.305	1082	0.305	1127	0.305	1172	0.305
903	0.305	948	0.305	993	0.305	1038	0.305	1083	0.305	1128	0.305	1173	0.305
904	0.305	949	0.305	994	0.305	1039	0.305	1084	0.305	1129	0.305	1174	0.305
905	0.305	950	0.305	995	0.305	1040	0.305	1085	0.305	1130	0.305	1175	0.305
906	0.305	951	0.305	996	0.305	1041	0.305	1086	0.305	1131	0.305	1176	0.305
907	0.305	952	0.305	997	0.305	1042	0.305	1087	0.305	1132	0.305	1177	0.305
908	0.305	953	0.305	998	0.305	1043	0.305	1088	0.305	1133	0.305	1178	0.305
909	0.305	954	0.305	999	0.305	1044	0.305	1089	0.305	1134	0.305	1179	0.305
910	0.305	955	0.305	1000	0.305	1045	0.305	1090	0.305	1135	0.305	1180	0.305
911	0.305	956	0.305	1001	0.305	1046	0.305	1091	0.305	1136	0.305	1181	0.305
912	0.305	957	0.305	1002	0.305	1047	0.305	1092	0.305	1137	0.305	1182	0.305
913	0.305	958	0.305	1003	0.305	1048	0.305	1093	0.305	1138	0.305	1183	0.305
914	0.305	959	0.305	1004	0.305	1049	0.305	1094	0.305	1139	0.305	1184	0.305
915	0.305	960	0.305	1005	0.305	1050	0.305	1095	0.305	1140	0.305	1185	0.305
916	0.305	961	0.305	1006	0.305	1051	0.305	1096	0.305	1141	0.305	1186	0.305
917	0.305	962	0.305	1007	0.305	1052	0.305	1097	0.305	1142	0.305	1187	0.305
918	0.305	963	0.305	1008	0.305	1053	0.305	1098	0.305	1143	0.305	1188	0.305
919	0.305	964	0.305	1009	0.305	1054	0.305	1099	0.305	1144	0.305	1189	0.305
920	0.305	965	0.305	1010	0.305	1055	0.305	1100	0.305	1145	0.305	1190	0.305
921	0.305	966	0.305	1011	0.305	1056	0.305	1101	0.305	1146	0.305	1191	0.305
922	0.305	967	0.305	1012	0.305	1057	0.305	1102	0.305	1147	0.305	1192	0.305
923	0.305	968	0.305	1013	0.305	1058	0.305	1103	0.305	1148	0.305	1193	0.305
924	0.305	969	0.305	1014	0.305	1059	0.305	1104	0.305	1149	0.305	1194	0.305
925	0.305	970	0.305	1015	0.305	1060	0.305	1105	0.305	1150	0.305	1195	0.305
926	0.305	971	0.305	1016	0.305	1061	0.305	1106	0.305	1151	0.305	1196	0.305
927	0.305	972	0.305	1017	0.305	1062	0.305	1107	0.305	1152	0.305	1197	0.305

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1198	0.305	1233	0.305	1268	0.305	1303	0.305	1338	0.305	1373	0.305	1408	0.305
1199	0.305	1234	0.305	1269	0.305	1304	0.305	1339	0.305	1374	0.305	1409	0.305
1200	0.305	1235	0.305	1270	0.305	1305	0.305	1340	0.305	1375	0.305	1410	0.305
1201	0.305	1236	0.305	1271	0.305	1306	0.305	1341	0.305	1376	0.305	1411	0.305
1202	0.305	1237	0.305	1272	0.305	1307	0.305	1342	0.305	1377	0.305	1412	0.305
1203	0.305	1238	0.305	1273	0.305	1308	0.305	1343	0.305	1378	0.305	1413	0.305
1204	0.305	1239	0.305	1274	0.305	1309	0.305	1344	0.305	1379	0.305	1414	0.305
1205	0.305	1240	0.305	1275	0.305	1310	0.305	1345	0.305	1380	0.305	1415	0.305
1206	0.305	1241	0.305	1276	0.305	1311	0.305	1346	0.305	1381	0.305	1416	0.305
1207	0.305	1242	0.305	1277	0.305	1312	0.305	1347	0.305	1382	0.305	1417	0.305
1208	0.305	1243	0.305	1278	0.305	1313	0.305	1348	0.305	1383	0.305	1418	0.305
1209	0.305	1244	0.305	1279	0.305	1314	0.305	1349	0.305	1384	0.305	1419	0.305
1210	0.305	1245	0.305	1280	0.305	1315	0.305	1350	0.305	1385	0.305	1420	0.305
1211	0.305	1246	0.305	1281	0.305	1316	0.305	1351	0.305	1386	0.305	1421	0.305
1212	0.305	1247	0.305	1282	0.305	1317	0.305	1352	0.305	1387	0.305	1422	0.305
1213	0.305	1248	0.305	1283	0.305	1318	0.305	1353	0.305	1388	0.305	1423	0.305
1214	0.305	1249	0.305	1284	0.305	1319	0.305	1354	0.305	1389	0.305	1424	0.305
1215	0.305	1250	0.305	1285	0.305	1320	0.305	1355	0.305	1390	0.305	1425	0.305
1216	0.305	1251	0.305	1286	0.305	1321	0.305	1356	0.305	1391	0.305	1426	0.305
1217	0.305	1252	0.305	1287	0.305	1322	0.305	1357	0.305	1392	0.305	1427	0.305
1218	0.305	1253	0.305	1288	0.305	1323	0.305	1358	0.305	1393	0.305	1428	0.305
1219	0.305	1254	0.305	1289	0.305	1324	0.305	1359	0.305	1394	0.305	1429	0.305
1220	0.305	1255	0.305	1290	0.305	1325	0.305	1360	0.305	1395	0.305	1430	0.305
1221	0.305	1256	0.305	1291	0.305	1326	0.305	1361	0.305	1396	0.305	1431	0.305
1222	0.305	1257	0.305	1292	0.305	1327	0.305	1362	0.305	1397	0.305	1432	0.305
1223	0.305	1258	0.305	1293	0.305	1328	0.305	1363	0.305	1398	0.305	1433	0.305
1224	0.305	1259	0.305	1294	0.305	1329	0.305	1364	0.305	1399	0.305	1434	0.305
1225	0.305	1260	0.305	1295	0.305	1330	0.305	1365	0.305	1400	0.305	1435	0.305
1226	0.305	1261	0.305	1296	0.305	1331	0.305	1366	0.305	1401	0.305	1436	0.305
1227	0.305	1262	0.305	1297	0.305	1332	0.305	1367	0.305	1402	0.305	1437	0.305
1228	0.305	1263	0.305	1298	0.305	1333	0.305	1368	0.305	1403	0.305	1438	0.305
1229	0.305	1264	0.305	1299	0.305	1334	0.305	1369	0.305	1404	0.305	1439	0.305
1230	0.305	1265	0.305	1300	0.305	1335	0.305	1370	0.305	1405	0.305	1440	0.305
1231	0.305	1266	0.305	1301	0.305	1336	0.305	1371	0.305	1406	0.305		
1232	0.305	1267	0.305	1302	0.305	1337	0.305	1372	0.305	1407	0.305		

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	30	90.950	90.586	-0.004	0.000	5.632	3.1	OK
S3.001	S9	15	90.890	90.571	0.041	0.000	11.297	11.7	SURCHARGED
S3.002	S10	60	90.830	90.499	0.029	0.000	12.483	9.1	SURCHARGED
S3.003	S11	360	90.780	90.472	0.052	0.000	17.083	5.9	SURCHARGED
S3.004	S12	360	90.740	90.470	0.090	0.000	75.987	2.6	SURCHARGED
S3.005	S13	2880	90.680	90.414	0.094	0.000	28.766	1.8	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	120	90.690	90.443	0.008	0.000	14.577	2.9	SURCHARGED
S4.001	S15	120	90.640	90.440	0.055	0.000	27.943	2.6	SURCHARGED
S3.006	S16	2880	90.630	90.413	0.143	0.000	28.515	2.7	SURCHARGED
S3.007	S17	2880	90.590	90.415	0.185	0.000	11.565	2.6	SURCHARGED
S3.008	S18	2880	90.560	90.412	0.232	0.000	32.859	2.2	SURCHARGED
S5.000	S19	120	90.780	90.494	0.009	0.000	17.528	5.1	SURCHARGED
S5.001	S20	120	90.710	90.491	0.076	0.000	8.345	2.3	SURCHARGED
S6.000	S21	2880	90.660	90.418	0.168	0.000	8.783	0.4	SURCHARGED
S5.002	S22	2880	90.660	90.418	0.218	0.000	39.494	1.9	SURCHARGED
S5.003	S23	2880	90.550	90.412	0.262	0.000	48.098	1.9	SURCHARGED
S3.009	S24	2880	90.540	90.411	0.551	0.000	195.288	1.0	SURCHARGED

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

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S3.000	S8	30	90.950	90.640	0.050	0.000	8.576	3.4	SURCHARGED
S3.001	S9	30	90.890	90.621	0.091	0.000	17.688	12.9	SURCHARGED
S3.002	S10	2880	90.830	90.619	0.149	0.000	23.876	2.0	SURCHARGED
S3.003	S11	2880	90.780	90.618	0.198	0.000	24.276	1.8	SURCHARGED
S3.004	S12	2880	90.740	90.617	0.237	0.000	108.718	1.7	SURCHARGED
S3.005	S13	2880	90.680	90.576	0.256	0.000	33.587	1.6	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S4.000	S14	2880	90.690	90.597	0.162	0.000	25.734	0.7	SURCHARGED
S4.001	S15	2880	90.640	90.597	0.212	0.000	45.295	1.4	SURCHARGED
S3.006	S16	2880	90.630	90.575	0.305	0.000	30.422	2.5	SURCHARGED
S3.007	S17	2880	90.590	90.574	0.344	0.000	11.745	2.6	SURCHARGED
S3.008	S18	2880	90.560	90.573	0.393	13.200	46.317	2.6	FLOOD
S5.000	S19	2880	90.780	90.598	0.113	0.000	33.251	1.2	SURCHARGED
S5.001	S20	2880	90.710	90.598	0.183	0.000	11.362	1.1	SURCHARGED
S6.000	S21	2880	90.660	90.583	0.333	0.000	10.003	0.4	SURCHARGED
S5.002	S22	2880	90.660	90.584	0.384	0.000	40.910	2.4	SURCHARGED
S5.003	S23	2880	90.550	90.573	0.423	22.848	71.091	2.7	FLOOD
S3.009	S24	2880	90.540	90.573	0.713	11.405	249.610	1.1	FLOOD

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Summary of Critical Results by Maximum Discharge Volume (Rank 1) for PHASE 2

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	17
Number of Online Controls	5	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Discharge Vol (m³)	Status
S3.009	S24	360	90.540	36.264	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for PHASE 3

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S7.000	21.032	0.165	127.5	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	27.037	0.060	450.6	0.063	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.002	18.819	0.045	418.2	0.066	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.003	15.436	0.035	441.0	0.064	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.004	6.959	0.070	99.4	0.046	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)
S7.000	67.82	5.39	90.100	0.019	0.0	0.0	0.0	0.89	15.7	3.5
S7.001	63.99	6.13	89.860	0.082	0.0	0.0	0.0	0.61	24.2	14.2
S7.002	61.69	6.63	89.800	0.148	0.0	0.0	0.0	0.63	25.2	24.8
S7.003	59.89	7.05	89.755	0.212	0.0	0.0	0.0	0.62	24.5«	34.4
S7.004	59.42	7.16	89.300	0.258	0.0	0.0	0.0	1.01	17.8«	41.5

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PIPELINE SCHEDULES for PHASE 3

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S7.000	o	150	S25	90.690	90.100	0.440	Open Manhole	1200
S7.001	o	225	S26	90.480	89.860	0.395	Open Manhole	1200
S7.002	o	225	S27	90.420	89.800	0.395	Open Manhole	1200
S7.003	o	225	S28	90.410	89.755	0.430	Open Manhole	1200
S7.004	o	150	S29	90.400	89.300	0.950	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S7.000	21.032	127.5	S26	90.480	89.935	0.395	Open Manhole	1200
S7.001	27.037	450.6	S27	90.420	89.800	0.395	Open Manhole	1200
S7.002	18.819	418.2	S28	90.410	89.755	0.430	Open Manhole	1200
S7.003	15.436	441.0	S29	90.400	89.720	0.455	Open Manhole	1200
S7.004	6.959	99.4	S	89.600	89.230	0.220	Open Manhole	0

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Online Controls for PHASE 3

Hydro-Brake® Optimum Manhole: S29, DS/PN: S7.004, Volume (m³): 1.8

Unit Reference	MD-SHE-0048-1000-0900-1000
Design Head (m)	0.900
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	48
Invert Level (m)	89.300
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	1.0	Kick-Flo®	0.428	0.7
Flush-Flo™	0.212	0.9	Mean Flow over Head Range	-	0.8

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	0.8	1.200	1.1	3.000	1.7	7.000	2.5
0.200	0.9	1.400	1.2	3.500	1.8	7.500	2.6
0.300	0.9	1.600	1.3	4.000	2.0	8.000	2.7
0.400	0.8	1.800	1.4	4.500	2.1	8.500	2.8
0.500	0.8	2.000	1.4	5.000	2.2	9.000	2.9
0.600	0.8	2.200	1.5	5.500	2.3	9.500	2.9
0.800	0.9	2.400	1.6	6.000	2.4		
1.000	1.0	2.600	1.6	6.500	2.5		

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Storage Structures for PHASE 3

Porous Car Park Manhole: S25, DS/PN: S7.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	19.0
Max Percolation (l/s)	52.8	Slope (1:X)	120.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	90.130	Cap Volume Depth (m)	0.380

Porous Car Park Manhole: S26, DS/PN: S7.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	54.0
Max Percolation (l/s)	150.0	Slope (1:X)	190.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.890	Cap Volume Depth (m)	0.410

Porous Car Park Manhole: S27, DS/PN: S7.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	39.0
Max Percolation (l/s)	108.3	Slope (1:X)	450.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.830	Cap Volume Depth (m)	0.410

Porous Car Park Manhole: S28, DS/PN: S7.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	43.0
Max Percolation (l/s)	119.4	Slope (1:X)	418.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.785	Cap Volume Depth (m)	0.440

Porous Car Park Manhole: S29, DS/PN: S7.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	16.0
Max Percolation (l/s)	44.4	Slope (1:X)	441.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.750	Cap Volume Depth (m)	0.460

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	30	90.690	90.137	-0.113	0.000	0.045	2.0	OK
S7.001	S26	60	90.480	89.938	-0.147	0.000	0.734	5.8	OK
S7.002	S27	960	90.420	89.930	-0.095	0.000	7.124	1.6	OK
S7.003	S28	960	90.410	89.928	-0.052	0.000	12.539	1.4	OK
S7.004	S29	960	90.400	89.927	0.477	0.000	8.793	0.9	SURCHARGED

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	15	90.690	90.145	-0.105	0.000	0.085	2.8	OK
S7.001	S26	960	90.480	89.955	-0.130	0.000	1.314	1.5	OK
S7.002	S27	960	90.420	89.954	-0.071	0.000	10.207	1.6	OK
S7.003	S28	960	90.410	89.953	-0.027	0.000	15.875	1.4	OK
S7.004	S29	960	90.400	89.952	0.502	0.000	10.052	0.9	SURCHARGED

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	15	90.690	90.180	-0.070	0.000	0.532	8.1	OK
S7.001	S26	720	90.480	90.103	0.018	0.000	13.341	1.8	SURCHARGED
S7.002	S27	720	90.420	90.102	0.077	0.000	28.106	1.7	SURCHARGED
S7.003	S28	720	90.410	90.101	0.121	0.000	35.196	1.4	SURCHARGED
S7.004	S29	720	90.400	90.099	0.649	0.000	17.365	0.9	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	15	90.690	90.202	-0.048	0.000	1.034	11.7	OK
S7.001	S26	960	90.480	90.200	0.115	0.000	27.856	1.5	SURCHARGED
S7.002	S27	960	90.420	90.199	0.174	0.000	39.577	1.3	SURCHARGED
S7.003	S28	960	90.410	90.198	0.218	0.000	47.820	1.2	SURCHARGED
S7.004	S29	960	90.400	90.196	0.746	0.000	22.128	1.0	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	1440	90.690	90.414	0.164	0.000	12.040	0.6	SURCHARGED
S7.001	S26	1440	90.480	90.414	0.329	0.000	59.113	1.2	SURCHARGED
S7.002	S27	1440	90.420	90.413	0.388	0.000	49.685	1.2	SURCHARGED
S7.003	S28	1440	90.410	90.411	0.431	1.282	59.473	1.5	FLOOD
S7.004	S29	1440	90.400	90.410	0.960	9.603	33.487	1.0	FLOOD

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Surcharged Outfall Details for PHASE 3

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S7.004	S	89.600	89.230	0.000	0	0

Datum (m) 89.380 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.500	37	0.500	73	0.500	109	0.500	145	0.500	181	0.500	217	0.500
2	0.500	38	0.500	74	0.500	110	0.500	146	0.500	182	0.500	218	0.500
3	0.500	39	0.500	75	0.500	111	0.500	147	0.500	183	0.500	219	0.500
4	0.500	40	0.500	76	0.500	112	0.500	148	0.500	184	0.500	220	0.500
5	0.500	41	0.500	77	0.500	113	0.500	149	0.500	185	0.500	221	0.500
6	0.500	42	0.500	78	0.500	114	0.500	150	0.500	186	0.500	222	0.500
7	0.500	43	0.500	79	0.500	115	0.500	151	0.500	187	0.500	223	0.500
8	0.500	44	0.500	80	0.500	116	0.500	152	0.500	188	0.500	224	0.500
9	0.500	45	0.500	81	0.500	117	0.500	153	0.500	189	0.500	225	0.500
10	0.500	46	0.500	82	0.500	118	0.500	154	0.500	190	0.500	226	0.500
11	0.500	47	0.500	83	0.500	119	0.500	155	0.500	191	0.500	227	0.500
12	0.500	48	0.500	84	0.500	120	0.500	156	0.500	192	0.500	228	0.500
13	0.500	49	0.500	85	0.500	121	0.500	157	0.500	193	0.500	229	0.500
14	0.500	50	0.500	86	0.500	122	0.500	158	0.500	194	0.500	230	0.500
15	0.500	51	0.500	87	0.500	123	0.500	159	0.500	195	0.500	231	0.500
16	0.500	52	0.500	88	0.500	124	0.500	160	0.500	196	0.500	232	0.500
17	0.500	53	0.500	89	0.500	125	0.500	161	0.500	197	0.500	233	0.500
18	0.500	54	0.500	90	0.500	126	0.500	162	0.500	198	0.500	234	0.500
19	0.500	55	0.500	91	0.500	127	0.500	163	0.500	199	0.500	235	0.500
20	0.500	56	0.500	92	0.500	128	0.500	164	0.500	200	0.500	236	0.500
21	0.500	57	0.500	93	0.500	129	0.500	165	0.500	201	0.500	237	0.500
22	0.500	58	0.500	94	0.500	130	0.500	166	0.500	202	0.500	238	0.500
23	0.500	59	0.500	95	0.500	131	0.500	167	0.500	203	0.500	239	0.500
24	0.500	60	0.500	96	0.500	132	0.500	168	0.500	204	0.500	240	0.500
25	0.500	61	0.500	97	0.500	133	0.500	169	0.500	205	0.500	241	0.500
26	0.500	62	0.500	98	0.500	134	0.500	170	0.500	206	0.500	242	0.500
27	0.500	63	0.500	99	0.500	135	0.500	171	0.500	207	0.500	243	0.500
28	0.500	64	0.500	100	0.500	136	0.500	172	0.500	208	0.500	244	0.500
29	0.500	65	0.500	101	0.500	137	0.500	173	0.500	209	0.500	245	0.500
30	0.500	66	0.500	102	0.500	138	0.500	174	0.500	210	0.500	246	0.500
31	0.500	67	0.500	103	0.500	139	0.500	175	0.500	211	0.500	247	0.500
32	0.500	68	0.500	104	0.500	140	0.500	176	0.500	212	0.500	248	0.500
33	0.500	69	0.500	105	0.500	141	0.500	177	0.500	213	0.500	249	0.500
34	0.500	70	0.500	106	0.500	142	0.500	178	0.500	214	0.500	250	0.500
35	0.500	71	0.500	107	0.500	143	0.500	179	0.500	215	0.500	251	0.500
36	0.500	72	0.500	108	0.500	144	0.500	180	0.500	216	0.500	252	0.500

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Surcharged Outfall Details for PHASE 3

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
253	0.500	298	0.500	343	0.500	388	0.500	433	0.500	478	0.500	523	0.500
254	0.500	299	0.500	344	0.500	389	0.500	434	0.500	479	0.500	524	0.500
255	0.500	300	0.500	345	0.500	390	0.500	435	0.500	480	0.500	525	0.500
256	0.500	301	0.500	346	0.500	391	0.500	436	0.500	481	0.500	526	0.500
257	0.500	302	0.500	347	0.500	392	0.500	437	0.500	482	0.500	527	0.500
258	0.500	303	0.500	348	0.500	393	0.500	438	0.500	483	0.500	528	0.500
259	0.500	304	0.500	349	0.500	394	0.500	439	0.500	484	0.500	529	0.500
260	0.500	305	0.500	350	0.500	395	0.500	440	0.500	485	0.500	530	0.500
261	0.500	306	0.500	351	0.500	396	0.500	441	0.500	486	0.500	531	0.500
262	0.500	307	0.500	352	0.500	397	0.500	442	0.500	487	0.500	532	0.500
263	0.500	308	0.500	353	0.500	398	0.500	443	0.500	488	0.500	533	0.500
264	0.500	309	0.500	354	0.500	399	0.500	444	0.500	489	0.500	534	0.500
265	0.500	310	0.500	355	0.500	400	0.500	445	0.500	490	0.500	535	0.500
266	0.500	311	0.500	356	0.500	401	0.500	446	0.500	491	0.500	536	0.500
267	0.500	312	0.500	357	0.500	402	0.500	447	0.500	492	0.500	537	0.500
268	0.500	313	0.500	358	0.500	403	0.500	448	0.500	493	0.500	538	0.500
269	0.500	314	0.500	359	0.500	404	0.500	449	0.500	494	0.500	539	0.500
270	0.500	315	0.500	360	0.500	405	0.500	450	0.500	495	0.500	540	0.500
271	0.500	316	0.500	361	0.500	406	0.500	451	0.500	496	0.500	541	0.500
272	0.500	317	0.500	362	0.500	407	0.500	452	0.500	497	0.500	542	0.500
273	0.500	318	0.500	363	0.500	408	0.500	453	0.500	498	0.500	543	0.500
274	0.500	319	0.500	364	0.500	409	0.500	454	0.500	499	0.500	544	0.500
275	0.500	320	0.500	365	0.500	410	0.500	455	0.500	500	0.500	545	0.500
276	0.500	321	0.500	366	0.500	411	0.500	456	0.500	501	0.500	546	0.500
277	0.500	322	0.500	367	0.500	412	0.500	457	0.500	502	0.500	547	0.500
278	0.500	323	0.500	368	0.500	413	0.500	458	0.500	503	0.500	548	0.500
279	0.500	324	0.500	369	0.500	414	0.500	459	0.500	504	0.500	549	0.500
280	0.500	325	0.500	370	0.500	415	0.500	460	0.500	505	0.500	550	0.500
281	0.500	326	0.500	371	0.500	416	0.500	461	0.500	506	0.500	551	0.500
282	0.500	327	0.500	372	0.500	417	0.500	462	0.500	507	0.500	552	0.500
283	0.500	328	0.500	373	0.500	418	0.500	463	0.500	508	0.500	553	0.500
284	0.500	329	0.500	374	0.500	419	0.500	464	0.500	509	0.500	554	0.500
285	0.500	330	0.500	375	0.500	420	0.500	465	0.500	510	0.500	555	0.500
286	0.500	331	0.500	376	0.500	421	0.500	466	0.500	511	0.500	556	0.500
287	0.500	332	0.500	377	0.500	422	0.500	467	0.500	512	0.500	557	0.500
288	0.500	333	0.500	378	0.500	423	0.500	468	0.500	513	0.500	558	0.500
289	0.500	334	0.500	379	0.500	424	0.500	469	0.500	514	0.500	559	0.500
290	0.500	335	0.500	380	0.500	425	0.500	470	0.500	515	0.500	560	0.500
291	0.500	336	0.500	381	0.500	426	0.500	471	0.500	516	0.500	561	0.500
292	0.500	337	0.500	382	0.500	427	0.500	472	0.500	517	0.500	562	0.500
293	0.500	338	0.500	383	0.500	428	0.500	473	0.500	518	0.500	563	0.500
294	0.500	339	0.500	384	0.500	429	0.500	474	0.500	519	0.500	564	0.500
295	0.500	340	0.500	385	0.500	430	0.500	475	0.500	520	0.500	565	0.500
296	0.500	341	0.500	386	0.500	431	0.500	476	0.500	521	0.500	566	0.500
297	0.500	342	0.500	387	0.500	432	0.500	477	0.500	522	0.500	567	0.500

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Surcharged Outfall Details for PHASE 3

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
568	0.500	613	0.500	658	0.500	703	0.500	748	0.500	793	0.500	838	0.500
569	0.500	614	0.500	659	0.500	704	0.500	749	0.500	794	0.500	839	0.500
570	0.500	615	0.500	660	0.500	705	0.500	750	0.500	795	0.500	840	0.500
571	0.500	616	0.500	661	0.500	706	0.500	751	0.500	796	0.500	841	0.500
572	0.500	617	0.500	662	0.500	707	0.500	752	0.500	797	0.500	842	0.500
573	0.500	618	0.500	663	0.500	708	0.500	753	0.500	798	0.500	843	0.500
574	0.500	619	0.500	664	0.500	709	0.500	754	0.500	799	0.500	844	0.500
575	0.500	620	0.500	665	0.500	710	0.500	755	0.500	800	0.500	845	0.500
576	0.500	621	0.500	666	0.500	711	0.500	756	0.500	801	0.500	846	0.500
577	0.500	622	0.500	667	0.500	712	0.500	757	0.500	802	0.500	847	0.500
578	0.500	623	0.500	668	0.500	713	0.500	758	0.500	803	0.500	848	0.500
579	0.500	624	0.500	669	0.500	714	0.500	759	0.500	804	0.500	849	0.500
580	0.500	625	0.500	670	0.500	715	0.500	760	0.500	805	0.500	850	0.500
581	0.500	626	0.500	671	0.500	716	0.500	761	0.500	806	0.500	851	0.500
582	0.500	627	0.500	672	0.500	717	0.500	762	0.500	807	0.500	852	0.500
583	0.500	628	0.500	673	0.500	718	0.500	763	0.500	808	0.500	853	0.500
584	0.500	629	0.500	674	0.500	719	0.500	764	0.500	809	0.500	854	0.500
585	0.500	630	0.500	675	0.500	720	0.500	765	0.500	810	0.500	855	0.500
586	0.500	631	0.500	676	0.500	721	0.500	766	0.500	811	0.500	856	0.500
587	0.500	632	0.500	677	0.500	722	0.500	767	0.500	812	0.500	857	0.500
588	0.500	633	0.500	678	0.500	723	0.500	768	0.500	813	0.500	858	0.500
589	0.500	634	0.500	679	0.500	724	0.500	769	0.500	814	0.500	859	0.500
590	0.500	635	0.500	680	0.500	725	0.500	770	0.500	815	0.500	860	0.500
591	0.500	636	0.500	681	0.500	726	0.500	771	0.500	816	0.500	861	0.500
592	0.500	637	0.500	682	0.500	727	0.500	772	0.500	817	0.500	862	0.500
593	0.500	638	0.500	683	0.500	728	0.500	773	0.500	818	0.500	863	0.500
594	0.500	639	0.500	684	0.500	729	0.500	774	0.500	819	0.500	864	0.500
595	0.500	640	0.500	685	0.500	730	0.500	775	0.500	820	0.500	865	0.500
596	0.500	641	0.500	686	0.500	731	0.500	776	0.500	821	0.500	866	0.500
597	0.500	642	0.500	687	0.500	732	0.500	777	0.500	822	0.500	867	0.500
598	0.500	643	0.500	688	0.500	733	0.500	778	0.500	823	0.500	868	0.500
599	0.500	644	0.500	689	0.500	734	0.500	779	0.500	824	0.500	869	0.500
600	0.500	645	0.500	690	0.500	735	0.500	780	0.500	825	0.500	870	0.500
601	0.500	646	0.500	691	0.500	736	0.500	781	0.500	826	0.500	871	0.500
602	0.500	647	0.500	692	0.500	737	0.500	782	0.500	827	0.500	872	0.500
603	0.500	648	0.500	693	0.500	738	0.500	783	0.500	828	0.500	873	0.500
604	0.500	649	0.500	694	0.500	739	0.500	784	0.500	829	0.500	874	0.500
605	0.500	650	0.500	695	0.500	740	0.500	785	0.500	830	0.500	875	0.500
606	0.500	651	0.500	696	0.500	741	0.500	786	0.500	831	0.500	876	0.500
607	0.500	652	0.500	697	0.500	742	0.500	787	0.500	832	0.500	877	0.500
608	0.500	653	0.500	698	0.500	743	0.500	788	0.500	833	0.500	878	0.500
609	0.500	654	0.500	699	0.500	744	0.500	789	0.500	834	0.500	879	0.500
610	0.500	655	0.500	700	0.500	745	0.500	790	0.500	835	0.500	880	0.500
611	0.500	656	0.500	701	0.500	746	0.500	791	0.500	836	0.500	881	0.500
612	0.500	657	0.500	702	0.500	747	0.500	792	0.500	837	0.500	882	0.500

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Surcharged Outfall Details for PHASE 3

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
883	0.500	928	0.500	973	0.500	1018	0.500	1063	0.500	1108	0.500	1153	0.500
884	0.500	929	0.500	974	0.500	1019	0.500	1064	0.500	1109	0.500	1154	0.500
885	0.500	930	0.500	975	0.500	1020	0.500	1065	0.500	1110	0.500	1155	0.500
886	0.500	931	0.500	976	0.500	1021	0.500	1066	0.500	1111	0.500	1156	0.500
887	0.500	932	0.500	977	0.500	1022	0.500	1067	0.500	1112	0.500	1157	0.500
888	0.500	933	0.500	978	0.500	1023	0.500	1068	0.500	1113	0.500	1158	0.500
889	0.500	934	0.500	979	0.500	1024	0.500	1069	0.500	1114	0.500	1159	0.500
890	0.500	935	0.500	980	0.500	1025	0.500	1070	0.500	1115	0.500	1160	0.500
891	0.500	936	0.500	981	0.500	1026	0.500	1071	0.500	1116	0.500	1161	0.500
892	0.500	937	0.500	982	0.500	1027	0.500	1072	0.500	1117	0.500	1162	0.500
893	0.500	938	0.500	983	0.500	1028	0.500	1073	0.500	1118	0.500	1163	0.500
894	0.500	939	0.500	984	0.500	1029	0.500	1074	0.500	1119	0.500	1164	0.500
895	0.500	940	0.500	985	0.500	1030	0.500	1075	0.500	1120	0.500	1165	0.500
896	0.500	941	0.500	986	0.500	1031	0.500	1076	0.500	1121	0.500	1166	0.500
897	0.500	942	0.500	987	0.500	1032	0.500	1077	0.500	1122	0.500	1167	0.500
898	0.500	943	0.500	988	0.500	1033	0.500	1078	0.500	1123	0.500	1168	0.500
899	0.500	944	0.500	989	0.500	1034	0.500	1079	0.500	1124	0.500	1169	0.500
900	0.500	945	0.500	990	0.500	1035	0.500	1080	0.500	1125	0.500	1170	0.500
901	0.500	946	0.500	991	0.500	1036	0.500	1081	0.500	1126	0.500	1171	0.500
902	0.500	947	0.500	992	0.500	1037	0.500	1082	0.500	1127	0.500	1172	0.500
903	0.500	948	0.500	993	0.500	1038	0.500	1083	0.500	1128	0.500	1173	0.500
904	0.500	949	0.500	994	0.500	1039	0.500	1084	0.500	1129	0.500	1174	0.500
905	0.500	950	0.500	995	0.500	1040	0.500	1085	0.500	1130	0.500	1175	0.500
906	0.500	951	0.500	996	0.500	1041	0.500	1086	0.500	1131	0.500	1176	0.500
907	0.500	952	0.500	997	0.500	1042	0.500	1087	0.500	1132	0.500	1177	0.500
908	0.500	953	0.500	998	0.500	1043	0.500	1088	0.500	1133	0.500	1178	0.500
909	0.500	954	0.500	999	0.500	1044	0.500	1089	0.500	1134	0.500	1179	0.500
910	0.500	955	0.500	1000	0.500	1045	0.500	1090	0.500	1135	0.500	1180	0.500
911	0.500	956	0.500	1001	0.500	1046	0.500	1091	0.500	1136	0.500	1181	0.500
912	0.500	957	0.500	1002	0.500	1047	0.500	1092	0.500	1137	0.500	1182	0.500
913	0.500	958	0.500	1003	0.500	1048	0.500	1093	0.500	1138	0.500	1183	0.500
914	0.500	959	0.500	1004	0.500	1049	0.500	1094	0.500	1139	0.500	1184	0.500
915	0.500	960	0.500	1005	0.500	1050	0.500	1095	0.500	1140	0.500	1185	0.500
916	0.500	961	0.500	1006	0.500	1051	0.500	1096	0.500	1141	0.500	1186	0.500
917	0.500	962	0.500	1007	0.500	1052	0.500	1097	0.500	1142	0.500	1187	0.500
918	0.500	963	0.500	1008	0.500	1053	0.500	1098	0.500	1143	0.500	1188	0.500
919	0.500	964	0.500	1009	0.500	1054	0.500	1099	0.500	1144	0.500	1189	0.500
920	0.500	965	0.500	1010	0.500	1055	0.500	1100	0.500	1145	0.500	1190	0.500
921	0.500	966	0.500	1011	0.500	1056	0.500	1101	0.500	1146	0.500	1191	0.500
922	0.500	967	0.500	1012	0.500	1057	0.500	1102	0.500	1147	0.500	1192	0.500
923	0.500	968	0.500	1013	0.500	1058	0.500	1103	0.500	1148	0.500	1193	0.500
924	0.500	969	0.500	1014	0.500	1059	0.500	1104	0.500	1149	0.500	1194	0.500
925	0.500	970	0.500	1015	0.500	1060	0.500	1105	0.500	1150	0.500	1195	0.500
926	0.500	971	0.500	1016	0.500	1061	0.500	1106	0.500	1151	0.500	1196	0.500
927	0.500	972	0.500	1017	0.500	1062	0.500	1107	0.500	1152	0.500	1197	0.500

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Surcharged Outfall Details for PHASE 3

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1198	0.500	1233	0.500	1268	0.500	1303	0.500	1338	0.500	1373	0.500	1408	0.500
1199	0.500	1234	0.500	1269	0.500	1304	0.500	1339	0.500	1374	0.500	1409	0.500
1200	0.500	1235	0.500	1270	0.500	1305	0.500	1340	0.500	1375	0.500	1410	0.500
1201	0.500	1236	0.500	1271	0.500	1306	0.500	1341	0.500	1376	0.500	1411	0.500
1202	0.500	1237	0.500	1272	0.500	1307	0.500	1342	0.500	1377	0.500	1412	0.500
1203	0.500	1238	0.500	1273	0.500	1308	0.500	1343	0.500	1378	0.500	1413	0.500
1204	0.500	1239	0.500	1274	0.500	1309	0.500	1344	0.500	1379	0.500	1414	0.500
1205	0.500	1240	0.500	1275	0.500	1310	0.500	1345	0.500	1380	0.500	1415	0.500
1206	0.500	1241	0.500	1276	0.500	1311	0.500	1346	0.500	1381	0.500	1416	0.500
1207	0.500	1242	0.500	1277	0.500	1312	0.500	1347	0.500	1382	0.500	1417	0.500
1208	0.500	1243	0.500	1278	0.500	1313	0.500	1348	0.500	1383	0.500	1418	0.500
1209	0.500	1244	0.500	1279	0.500	1314	0.500	1349	0.500	1384	0.500	1419	0.500
1210	0.500	1245	0.500	1280	0.500	1315	0.500	1350	0.500	1385	0.500	1420	0.500
1211	0.500	1246	0.500	1281	0.500	1316	0.500	1351	0.500	1386	0.500	1421	0.500
1212	0.500	1247	0.500	1282	0.500	1317	0.500	1352	0.500	1387	0.500	1422	0.500
1213	0.500	1248	0.500	1283	0.500	1318	0.500	1353	0.500	1388	0.500	1423	0.500
1214	0.500	1249	0.500	1284	0.500	1319	0.500	1354	0.500	1389	0.500	1424	0.500
1215	0.500	1250	0.500	1285	0.500	1320	0.500	1355	0.500	1390	0.500	1425	0.500
1216	0.500	1251	0.500	1286	0.500	1321	0.500	1356	0.500	1391	0.500	1426	0.500
1217	0.500	1252	0.500	1287	0.500	1322	0.500	1357	0.500	1392	0.500	1427	0.500
1218	0.500	1253	0.500	1288	0.500	1323	0.500	1358	0.500	1393	0.500	1428	0.500
1219	0.500	1254	0.500	1289	0.500	1324	0.500	1359	0.500	1394	0.500	1429	0.500
1220	0.500	1255	0.500	1290	0.500	1325	0.500	1360	0.500	1395	0.500	1430	0.500
1221	0.500	1256	0.500	1291	0.500	1326	0.500	1361	0.500	1396	0.500	1431	0.500
1222	0.500	1257	0.500	1292	0.500	1327	0.500	1362	0.500	1397	0.500	1432	0.500
1223	0.500	1258	0.500	1293	0.500	1328	0.500	1363	0.500	1398	0.500	1433	0.500
1224	0.500	1259	0.500	1294	0.500	1329	0.500	1364	0.500	1399	0.500	1434	0.500
1225	0.500	1260	0.500	1295	0.500	1330	0.500	1365	0.500	1400	0.500	1435	0.500
1226	0.500	1261	0.500	1296	0.500	1331	0.500	1366	0.500	1401	0.500	1436	0.500
1227	0.500	1262	0.500	1297	0.500	1332	0.500	1367	0.500	1402	0.500	1437	0.500
1228	0.500	1263	0.500	1298	0.500	1333	0.500	1368	0.500	1403	0.500	1438	0.500
1229	0.500	1264	0.500	1299	0.500	1334	0.500	1369	0.500	1404	0.500	1439	0.500
1230	0.500	1265	0.500	1300	0.500	1335	0.500	1370	0.500	1405	0.500	1440	0.500
1231	0.500	1266	0.500	1301	0.500	1336	0.500	1371	0.500	1406	0.500		
1232	0.500	1267	0.500	1302	0.500	1337	0.500	1372	0.500	1407	0.500		

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	1440	90.690	90.238	-0.012	0.000	2.239	0.7	OK
S7.001	S26	1440	90.480	90.238	0.153	0.000	34.066	1.0	SURCHARGED
S7.002	S27	1440	90.420	90.237	0.212	0.000	44.074	0.8	SURCHARGED
S7.003	S28	1440	90.410	90.236	0.256	0.000	52.720	0.9	SURCHARGED
S7.004	S29	1440	90.400	90.235	0.785	0.000	23.611	1.0	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S7.000	S25	1440	90.690	90.424	0.174	0.000	12.579	0.6	SURCHARGED
S7.001	S26	1440	90.480	90.423	0.338	0.000	60.008	1.2	SURCHARGED
S7.002	S27	1440	90.420	90.422	0.397	2.330	52.023	1.8	FLOOD
S7.003	S28	1440	90.410	90.421	0.441	11.216	69.412	2.4	FLOOD
S7.004	S29	1440	90.400	90.420	0.970	19.855	43.739	1.0	FLOOD

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Summary of Critical Results by Maximum Discharge Volume (Rank 1) for PHASE 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Discharge Vol (m³)	Status
S7.004	S29	360	90.400	38.385	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for PHASE 4

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S8.000	33.348	0.060	555.8	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
S8.001	18.941	0.040	473.5	0.052	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.002	15.938	0.040	398.5	0.097	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.003	6.067	0.090	67.4	0.035	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)
S8.000	64.57	6.01	89.780	0.050	0.0	0.0	0.0	0.55	21.8	8.8
S8.001	62.06	6.55	89.720	0.103	0.0	0.0	0.0	0.59	23.6	17.3
S8.002	60.28	6.96	89.680	0.200	0.0	0.0	0.0	0.65	25.8«	32.6
S8.003	59.93	7.04	89.100	0.234	0.0	0.0	0.0	1.23	21.7«	38.0

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PIPELINE SCHEDULES for PHASE 4

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.000	o	225	S30	90.410	89.780	0.405	Open Manhole	1200
S8.001	o	225	S31	90.390	89.720	0.445	Open Manhole	1200
S8.002	o	225	S32	90.370	89.680	0.465	Open Manhole	1200
S8.003	o	150	S33	90.340	89.100	1.090	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.000	33.348	555.8	S31	90.390	89.720	0.445	Open Manhole	1200
S8.001	18.941	473.5	S32	90.370	89.680	0.465	Open Manhole	1200
S8.002	15.938	398.5	S33	90.340	89.640	0.475	Open Manhole	1200
S8.003	6.067	67.4	S	89.500	89.010	0.340	Open Manhole	0

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Online Controls for PHASE 4

Hydro-Brake® Optimum Manhole: S33, DS/PN: S8.003, Volume (m³): 2.0

Unit Reference	MD-SHE-0046-1000-1100-1000
Design Head (m)	1.100
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	46
Invert Level (m)	89.100
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	1.0	Kick-Flo®	0.408	0.6
Flush-Flo™	0.200	0.8	Mean Flow over Head Range	-	0.8

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	0.7	1.200	1.0	3.000	1.6	7.000	2.3
0.200	0.8	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.8	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.7	1.800	1.2	4.500	1.9	8.500	2.5
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.6
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.2		

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Storage Structures for PHASE 4

Porous Car Park Manhole: S30, DS/PN: S8.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	86.1	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.780	Cap Volume Depth (m)	0.420

Porous Car Park Manhole: S31, DS/PN: S8.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	49.0
Max Percolation (l/s)	136.1	Slope (1:X)	555.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.720	Cap Volume Depth (m)	0.460

Porous Car Park Manhole: S32, DS/PN: S8.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	51.0
Max Percolation (l/s)	141.7	Slope (1:X)	473.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.680	Cap Volume Depth (m)	0.480

Porous Car Park Manhole: S33, DS/PN: S8.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	41.7	Slope (1:X)	398.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.640	Cap Volume Depth (m)	0.460

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	60	90.410	89.834	-0.171	0.000	1.385	2.7	OK
S8.001	S31	960	90.390	89.807	-0.138	0.000	6.673	1.1	OK
S8.002	S32	960	90.370	89.806	-0.099	0.000	11.501	1.5	OK
S8.003	S33	960	90.340	89.805	0.555	0.000	7.740	0.8	SURCHARGED

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	30	90.410	89.843	-0.162	0.000	1.831	3.5	OK
S8.001	S31	960	90.390	89.826	-0.119	0.000	9.630	1.1	OK
S8.002	S32	960	90.370	89.826	-0.079	0.000	14.579	1.4	OK
S8.003	S33	960	90.340	89.824	0.574	0.000	8.680	0.8	SURCHARGED

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	720	90.410	89.944	-0.061	0.000	10.587	1.1	OK
S8.001	S31	720	90.390	89.944	-0.001	0.000	27.700	1.1	OK
S8.002	S32	720	90.370	89.943	0.038	0.000	32.913	1.5	SURCHARGED
S8.003	S33	720	90.340	89.941	0.691	0.000	14.247	0.9	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	960	90.410	90.033	0.028	0.000	19.047	1.0	SURCHARGED
S8.001	S31	960	90.390	90.033	0.088	0.000	41.198	0.9	SURCHARGED
S8.002	S32	960	90.370	90.033	0.128	0.000	46.791	1.2	SURCHARGED
S8.003	S33	960	90.340	90.031	0.781	0.000	18.384	0.9	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	1440	90.410	90.198	0.193	0.000	34.571	0.7	SURCHARGED
S8.001	S31	1440	90.390	90.198	0.253	0.000	65.343	1.0	SURCHARGED
S8.002	S32	1440	90.370	90.199	0.294	0.000	71.342	1.8	SURCHARGED
S8.003	S33	1440	90.340	90.340	1.090	0.517	22.946	1.0	FLOOD

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Surcharged Outfall Details for PHASE 4

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S8.003	S	89.500	89.010	0.000	0	0

Datum (m) 89.160 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.550	37	0.550	73	0.550	109	0.550	145	0.550	181	0.550	217	0.550
2	0.550	38	0.550	74	0.550	110	0.550	146	0.550	182	0.550	218	0.550
3	0.550	39	0.550	75	0.550	111	0.550	147	0.550	183	0.550	219	0.550
4	0.550	40	0.550	76	0.550	112	0.550	148	0.550	184	0.550	220	0.550
5	0.550	41	0.550	77	0.550	113	0.550	149	0.550	185	0.550	221	0.550
6	0.550	42	0.550	78	0.550	114	0.550	150	0.550	186	0.550	222	0.550
7	0.550	43	0.550	79	0.550	115	0.550	151	0.550	187	0.550	223	0.550
8	0.550	44	0.550	80	0.550	116	0.550	152	0.550	188	0.550	224	0.550
9	0.550	45	0.550	81	0.550	117	0.550	153	0.550	189	0.550	225	0.550
10	0.550	46	0.550	82	0.550	118	0.550	154	0.550	190	0.550	226	0.550
11	0.550	47	0.550	83	0.550	119	0.550	155	0.550	191	0.550	227	0.550
12	0.550	48	0.550	84	0.550	120	0.550	156	0.550	192	0.550	228	0.550
13	0.550	49	0.550	85	0.550	121	0.550	157	0.550	193	0.550	229	0.550
14	0.550	50	0.550	86	0.550	122	0.550	158	0.550	194	0.550	230	0.550
15	0.550	51	0.550	87	0.550	123	0.550	159	0.550	195	0.550	231	0.550
16	0.550	52	0.550	88	0.550	124	0.550	160	0.550	196	0.550	232	0.550
17	0.550	53	0.550	89	0.550	125	0.550	161	0.550	197	0.550	233	0.550
18	0.550	54	0.550	90	0.550	126	0.550	162	0.550	198	0.550	234	0.550
19	0.550	55	0.550	91	0.550	127	0.550	163	0.550	199	0.550	235	0.550
20	0.550	56	0.550	92	0.550	128	0.550	164	0.550	200	0.550	236	0.550
21	0.550	57	0.550	93	0.550	129	0.550	165	0.550	201	0.550	237	0.550
22	0.550	58	0.550	94	0.550	130	0.550	166	0.550	202	0.550	238	0.550
23	0.550	59	0.550	95	0.550	131	0.550	167	0.550	203	0.550	239	0.550
24	0.550	60	0.550	96	0.550	132	0.550	168	0.550	204	0.550	240	0.550
25	0.550	61	0.550	97	0.550	133	0.550	169	0.550	205	0.550	241	0.550
26	0.550	62	0.550	98	0.550	134	0.550	170	0.550	206	0.550	242	0.550
27	0.550	63	0.550	99	0.550	135	0.550	171	0.550	207	0.550	243	0.550
28	0.550	64	0.550	100	0.550	136	0.550	172	0.550	208	0.550	244	0.550
29	0.550	65	0.550	101	0.550	137	0.550	173	0.550	209	0.550	245	0.550
30	0.550	66	0.550	102	0.550	138	0.550	174	0.550	210	0.550	246	0.550
31	0.550	67	0.550	103	0.550	139	0.550	175	0.550	211	0.550	247	0.550
32	0.550	68	0.550	104	0.550	140	0.550	176	0.550	212	0.550	248	0.550
33	0.550	69	0.550	105	0.550	141	0.550	177	0.550	213	0.550	249	0.550
34	0.550	70	0.550	106	0.550	142	0.550	178	0.550	214	0.550	250	0.550
35	0.550	71	0.550	107	0.550	143	0.550	179	0.550	215	0.550	251	0.550
36	0.550	72	0.550	108	0.550	144	0.550	180	0.550	216	0.550	252	0.550

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Surcharged Outfall Details for PHASE 4

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
253	0.550	298	0.550	343	0.550	388	0.550	433	0.550	478	0.550	523	0.550
254	0.550	299	0.550	344	0.550	389	0.550	434	0.550	479	0.550	524	0.550
255	0.550	300	0.550	345	0.550	390	0.550	435	0.550	480	0.550	525	0.550
256	0.550	301	0.550	346	0.550	391	0.550	436	0.550	481	0.550	526	0.550
257	0.550	302	0.550	347	0.550	392	0.550	437	0.550	482	0.550	527	0.550
258	0.550	303	0.550	348	0.550	393	0.550	438	0.550	483	0.550	528	0.550
259	0.550	304	0.550	349	0.550	394	0.550	439	0.550	484	0.550	529	0.550
260	0.550	305	0.550	350	0.550	395	0.550	440	0.550	485	0.550	530	0.550
261	0.550	306	0.550	351	0.550	396	0.550	441	0.550	486	0.550	531	0.550
262	0.550	307	0.550	352	0.550	397	0.550	442	0.550	487	0.550	532	0.550
263	0.550	308	0.550	353	0.550	398	0.550	443	0.550	488	0.550	533	0.550
264	0.550	309	0.550	354	0.550	399	0.550	444	0.550	489	0.550	534	0.550
265	0.550	310	0.550	355	0.550	400	0.550	445	0.550	490	0.550	535	0.550
266	0.550	311	0.550	356	0.550	401	0.550	446	0.550	491	0.550	536	0.550
267	0.550	312	0.550	357	0.550	402	0.550	447	0.550	492	0.550	537	0.550
268	0.550	313	0.550	358	0.550	403	0.550	448	0.550	493	0.550	538	0.550
269	0.550	314	0.550	359	0.550	404	0.550	449	0.550	494	0.550	539	0.550
270	0.550	315	0.550	360	0.550	405	0.550	450	0.550	495	0.550	540	0.550
271	0.550	316	0.550	361	0.550	406	0.550	451	0.550	496	0.550	541	0.550
272	0.550	317	0.550	362	0.550	407	0.550	452	0.550	497	0.550	542	0.550
273	0.550	318	0.550	363	0.550	408	0.550	453	0.550	498	0.550	543	0.550
274	0.550	319	0.550	364	0.550	409	0.550	454	0.550	499	0.550	544	0.550
275	0.550	320	0.550	365	0.550	410	0.550	455	0.550	500	0.550	545	0.550
276	0.550	321	0.550	366	0.550	411	0.550	456	0.550	501	0.550	546	0.550
277	0.550	322	0.550	367	0.550	412	0.550	457	0.550	502	0.550	547	0.550
278	0.550	323	0.550	368	0.550	413	0.550	458	0.550	503	0.550	548	0.550
279	0.550	324	0.550	369	0.550	414	0.550	459	0.550	504	0.550	549	0.550
280	0.550	325	0.550	370	0.550	415	0.550	460	0.550	505	0.550	550	0.550
281	0.550	326	0.550	371	0.550	416	0.550	461	0.550	506	0.550	551	0.550
282	0.550	327	0.550	372	0.550	417	0.550	462	0.550	507	0.550	552	0.550
283	0.550	328	0.550	373	0.550	418	0.550	463	0.550	508	0.550	553	0.550
284	0.550	329	0.550	374	0.550	419	0.550	464	0.550	509	0.550	554	0.550
285	0.550	330	0.550	375	0.550	420	0.550	465	0.550	510	0.550	555	0.550
286	0.550	331	0.550	376	0.550	421	0.550	466	0.550	511	0.550	556	0.550
287	0.550	332	0.550	377	0.550	422	0.550	467	0.550	512	0.550	557	0.550
288	0.550	333	0.550	378	0.550	423	0.550	468	0.550	513	0.550	558	0.550
289	0.550	334	0.550	379	0.550	424	0.550	469	0.550	514	0.550	559	0.550
290	0.550	335	0.550	380	0.550	425	0.550	470	0.550	515	0.550	560	0.550
291	0.550	336	0.550	381	0.550	426	0.550	471	0.550	516	0.550	561	0.550
292	0.550	337	0.550	382	0.550	427	0.550	472	0.550	517	0.550	562	0.550
293	0.550	338	0.550	383	0.550	428	0.550	473	0.550	518	0.550	563	0.550
294	0.550	339	0.550	384	0.550	429	0.550	474	0.550	519	0.550	564	0.550
295	0.550	340	0.550	385	0.550	430	0.550	475	0.550	520	0.550	565	0.550
296	0.550	341	0.550	386	0.550	431	0.550	476	0.550	521	0.550	566	0.550
297	0.550	342	0.550	387	0.550	432	0.550	477	0.550	522	0.550	567	0.550

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Surcharged Outfall Details for PHASE 4

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
568	0.550	613	0.550	658	0.550	703	0.550	748	0.550	793	0.550	838	0.550
569	0.550	614	0.550	659	0.550	704	0.550	749	0.550	794	0.550	839	0.550
570	0.550	615	0.550	660	0.550	705	0.550	750	0.550	795	0.550	840	0.550
571	0.550	616	0.550	661	0.550	706	0.550	751	0.550	796	0.550	841	0.550
572	0.550	617	0.550	662	0.550	707	0.550	752	0.550	797	0.550	842	0.550
573	0.550	618	0.550	663	0.550	708	0.550	753	0.550	798	0.550	843	0.550
574	0.550	619	0.550	664	0.550	709	0.550	754	0.550	799	0.550	844	0.550
575	0.550	620	0.550	665	0.550	710	0.550	755	0.550	800	0.550	845	0.550
576	0.550	621	0.550	666	0.550	711	0.550	756	0.550	801	0.550	846	0.550
577	0.550	622	0.550	667	0.550	712	0.550	757	0.550	802	0.550	847	0.550
578	0.550	623	0.550	668	0.550	713	0.550	758	0.550	803	0.550	848	0.550
579	0.550	624	0.550	669	0.550	714	0.550	759	0.550	804	0.550	849	0.550
580	0.550	625	0.550	670	0.550	715	0.550	760	0.550	805	0.550	850	0.550
581	0.550	626	0.550	671	0.550	716	0.550	761	0.550	806	0.550	851	0.550
582	0.550	627	0.550	672	0.550	717	0.550	762	0.550	807	0.550	852	0.550
583	0.550	628	0.550	673	0.550	718	0.550	763	0.550	808	0.550	853	0.550
584	0.550	629	0.550	674	0.550	719	0.550	764	0.550	809	0.550	854	0.550
585	0.550	630	0.550	675	0.550	720	0.550	765	0.550	810	0.550	855	0.550
586	0.550	631	0.550	676	0.550	721	0.550	766	0.550	811	0.550	856	0.550
587	0.550	632	0.550	677	0.550	722	0.550	767	0.550	812	0.550	857	0.550
588	0.550	633	0.550	678	0.550	723	0.550	768	0.550	813	0.550	858	0.550
589	0.550	634	0.550	679	0.550	724	0.550	769	0.550	814	0.550	859	0.550
590	0.550	635	0.550	680	0.550	725	0.550	770	0.550	815	0.550	860	0.550
591	0.550	636	0.550	681	0.550	726	0.550	771	0.550	816	0.550	861	0.550
592	0.550	637	0.550	682	0.550	727	0.550	772	0.550	817	0.550	862	0.550
593	0.550	638	0.550	683	0.550	728	0.550	773	0.550	818	0.550	863	0.550
594	0.550	639	0.550	684	0.550	729	0.550	774	0.550	819	0.550	864	0.550
595	0.550	640	0.550	685	0.550	730	0.550	775	0.550	820	0.550	865	0.550
596	0.550	641	0.550	686	0.550	731	0.550	776	0.550	821	0.550	866	0.550
597	0.550	642	0.550	687	0.550	732	0.550	777	0.550	822	0.550	867	0.550
598	0.550	643	0.550	688	0.550	733	0.550	778	0.550	823	0.550	868	0.550
599	0.550	644	0.550	689	0.550	734	0.550	779	0.550	824	0.550	869	0.550
600	0.550	645	0.550	690	0.550	735	0.550	780	0.550	825	0.550	870	0.550
601	0.550	646	0.550	691	0.550	736	0.550	781	0.550	826	0.550	871	0.550
602	0.550	647	0.550	692	0.550	737	0.550	782	0.550	827	0.550	872	0.550
603	0.550	648	0.550	693	0.550	738	0.550	783	0.550	828	0.550	873	0.550
604	0.550	649	0.550	694	0.550	739	0.550	784	0.550	829	0.550	874	0.550
605	0.550	650	0.550	695	0.550	740	0.550	785	0.550	830	0.550	875	0.550
606	0.550	651	0.550	696	0.550	741	0.550	786	0.550	831	0.550	876	0.550
607	0.550	652	0.550	697	0.550	742	0.550	787	0.550	832	0.550	877	0.550
608	0.550	653	0.550	698	0.550	743	0.550	788	0.550	833	0.550	878	0.550
609	0.550	654	0.550	699	0.550	744	0.550	789	0.550	834	0.550	879	0.550
610	0.550	655	0.550	700	0.550	745	0.550	790	0.550	835	0.550	880	0.550
611	0.550	656	0.550	701	0.550	746	0.550	791	0.550	836	0.550	881	0.550
612	0.550	657	0.550	702	0.550	747	0.550	792	0.550	837	0.550	882	0.550

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Surcharged Outfall Details for PHASE 4

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
883	0.550	928	0.550	973	0.550	1018	0.550	1063	0.550	1108	0.550	1153	0.550
884	0.550	929	0.550	974	0.550	1019	0.550	1064	0.550	1109	0.550	1154	0.550
885	0.550	930	0.550	975	0.550	1020	0.550	1065	0.550	1110	0.550	1155	0.550
886	0.550	931	0.550	976	0.550	1021	0.550	1066	0.550	1111	0.550	1156	0.550
887	0.550	932	0.550	977	0.550	1022	0.550	1067	0.550	1112	0.550	1157	0.550
888	0.550	933	0.550	978	0.550	1023	0.550	1068	0.550	1113	0.550	1158	0.550
889	0.550	934	0.550	979	0.550	1024	0.550	1069	0.550	1114	0.550	1159	0.550
890	0.550	935	0.550	980	0.550	1025	0.550	1070	0.550	1115	0.550	1160	0.550
891	0.550	936	0.550	981	0.550	1026	0.550	1071	0.550	1116	0.550	1161	0.550
892	0.550	937	0.550	982	0.550	1027	0.550	1072	0.550	1117	0.550	1162	0.550
893	0.550	938	0.550	983	0.550	1028	0.550	1073	0.550	1118	0.550	1163	0.550
894	0.550	939	0.550	984	0.550	1029	0.550	1074	0.550	1119	0.550	1164	0.550
895	0.550	940	0.550	985	0.550	1030	0.550	1075	0.550	1120	0.550	1165	0.550
896	0.550	941	0.550	986	0.550	1031	0.550	1076	0.550	1121	0.550	1166	0.550
897	0.550	942	0.550	987	0.550	1032	0.550	1077	0.550	1122	0.550	1167	0.550
898	0.550	943	0.550	988	0.550	1033	0.550	1078	0.550	1123	0.550	1168	0.550
899	0.550	944	0.550	989	0.550	1034	0.550	1079	0.550	1124	0.550	1169	0.550
900	0.550	945	0.550	990	0.550	1035	0.550	1080	0.550	1125	0.550	1170	0.550
901	0.550	946	0.550	991	0.550	1036	0.550	1081	0.550	1126	0.550	1171	0.550
902	0.550	947	0.550	992	0.550	1037	0.550	1082	0.550	1127	0.550	1172	0.550
903	0.550	948	0.550	993	0.550	1038	0.550	1083	0.550	1128	0.550	1173	0.550
904	0.550	949	0.550	994	0.550	1039	0.550	1084	0.550	1129	0.550	1174	0.550
905	0.550	950	0.550	995	0.550	1040	0.550	1085	0.550	1130	0.550	1175	0.550
906	0.550	951	0.550	996	0.550	1041	0.550	1086	0.550	1131	0.550	1176	0.550
907	0.550	952	0.550	997	0.550	1042	0.550	1087	0.550	1132	0.550	1177	0.550
908	0.550	953	0.550	998	0.550	1043	0.550	1088	0.550	1133	0.550	1178	0.550
909	0.550	954	0.550	999	0.550	1044	0.550	1089	0.550	1134	0.550	1179	0.550
910	0.550	955	0.550	1000	0.550	1045	0.550	1090	0.550	1135	0.550	1180	0.550
911	0.550	956	0.550	1001	0.550	1046	0.550	1091	0.550	1136	0.550	1181	0.550
912	0.550	957	0.550	1002	0.550	1047	0.550	1092	0.550	1137	0.550	1182	0.550
913	0.550	958	0.550	1003	0.550	1048	0.550	1093	0.550	1138	0.550	1183	0.550
914	0.550	959	0.550	1004	0.550	1049	0.550	1094	0.550	1139	0.550	1184	0.550
915	0.550	960	0.550	1005	0.550	1050	0.550	1095	0.550	1140	0.550	1185	0.550
916	0.550	961	0.550	1006	0.550	1051	0.550	1096	0.550	1141	0.550	1186	0.550
917	0.550	962	0.550	1007	0.550	1052	0.550	1097	0.550	1142	0.550	1187	0.550
918	0.550	963	0.550	1008	0.550	1053	0.550	1098	0.550	1143	0.550	1188	0.550
919	0.550	964	0.550	1009	0.550	1054	0.550	1099	0.550	1144	0.550	1189	0.550
920	0.550	965	0.550	1010	0.550	1055	0.550	1100	0.550	1145	0.550	1190	0.550
921	0.550	966	0.550	1011	0.550	1056	0.550	1101	0.550	1146	0.550	1191	0.550
922	0.550	967	0.550	1012	0.550	1057	0.550	1102	0.550	1147	0.550	1192	0.550
923	0.550	968	0.550	1013	0.550	1058	0.550	1103	0.550	1148	0.550	1193	0.550
924	0.550	969	0.550	1014	0.550	1059	0.550	1104	0.550	1149	0.550	1194	0.550
925	0.550	970	0.550	1015	0.550	1060	0.550	1105	0.550	1150	0.550	1195	0.550
926	0.550	971	0.550	1016	0.550	1061	0.550	1106	0.550	1151	0.550	1196	0.550
927	0.550	972	0.550	1017	0.550	1062	0.550	1107	0.550	1152	0.550	1197	0.550

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Surcharged Outfall Details for PHASE 4

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1198	0.550	1233	0.550	1268	0.550	1303	0.550	1338	0.550	1373	0.550	1408	0.550
1199	0.550	1234	0.550	1269	0.550	1304	0.550	1339	0.550	1374	0.550	1409	0.550
1200	0.550	1235	0.550	1270	0.550	1305	0.550	1340	0.550	1375	0.550	1410	0.550
1201	0.550	1236	0.550	1271	0.550	1306	0.550	1341	0.550	1376	0.550	1411	0.550
1202	0.550	1237	0.550	1272	0.550	1307	0.550	1342	0.550	1377	0.550	1412	0.550
1203	0.550	1238	0.550	1273	0.550	1308	0.550	1343	0.550	1378	0.550	1413	0.550
1204	0.550	1239	0.550	1274	0.550	1309	0.550	1344	0.550	1379	0.550	1414	0.550
1205	0.550	1240	0.550	1275	0.550	1310	0.550	1345	0.550	1380	0.550	1415	0.550
1206	0.550	1241	0.550	1276	0.550	1311	0.550	1346	0.550	1381	0.550	1416	0.550
1207	0.550	1242	0.550	1277	0.550	1312	0.550	1347	0.550	1382	0.550	1417	0.550
1208	0.550	1243	0.550	1278	0.550	1313	0.550	1348	0.550	1383	0.550	1418	0.550
1209	0.550	1244	0.550	1279	0.550	1314	0.550	1349	0.550	1384	0.550	1419	0.550
1210	0.550	1245	0.550	1280	0.550	1315	0.550	1350	0.550	1385	0.550	1420	0.550
1211	0.550	1246	0.550	1281	0.550	1316	0.550	1351	0.550	1386	0.550	1421	0.550
1212	0.550	1247	0.550	1282	0.550	1317	0.550	1352	0.550	1387	0.550	1422	0.550
1213	0.550	1248	0.550	1283	0.550	1318	0.550	1353	0.550	1388	0.550	1423	0.550
1214	0.550	1249	0.550	1284	0.550	1319	0.550	1354	0.550	1389	0.550	1424	0.550
1215	0.550	1250	0.550	1285	0.550	1320	0.550	1355	0.550	1390	0.550	1425	0.550
1216	0.550	1251	0.550	1286	0.550	1321	0.550	1356	0.550	1391	0.550	1426	0.550
1217	0.550	1252	0.550	1287	0.550	1322	0.550	1357	0.550	1392	0.550	1427	0.550
1218	0.550	1253	0.550	1288	0.550	1323	0.550	1358	0.550	1393	0.550	1428	0.550
1219	0.550	1254	0.550	1289	0.550	1324	0.550	1359	0.550	1394	0.550	1429	0.550
1220	0.550	1255	0.550	1290	0.550	1325	0.550	1360	0.550	1395	0.550	1430	0.550
1221	0.550	1256	0.550	1291	0.550	1326	0.550	1361	0.550	1396	0.550	1431	0.550
1222	0.550	1257	0.550	1292	0.550	1327	0.550	1362	0.550	1397	0.550	1432	0.550
1223	0.550	1258	0.550	1293	0.550	1328	0.550	1363	0.550	1398	0.550	1433	0.550
1224	0.550	1259	0.550	1294	0.550	1329	0.550	1364	0.550	1399	0.550	1434	0.550
1225	0.550	1260	0.550	1295	0.550	1330	0.550	1365	0.550	1400	0.550	1435	0.550
1226	0.550	1261	0.550	1296	0.550	1331	0.550	1366	0.550	1401	0.550	1436	0.550
1227	0.550	1262	0.550	1297	0.550	1332	0.550	1367	0.550	1402	0.550	1437	0.550
1228	0.550	1263	0.550	1298	0.550	1333	0.550	1368	0.550	1403	0.550	1438	0.550
1229	0.550	1264	0.550	1299	0.550	1334	0.550	1369	0.550	1404	0.550	1439	0.550
1230	0.550	1265	0.550	1300	0.550	1335	0.550	1370	0.550	1405	0.550	1440	0.550
1231	0.550	1266	0.550	1301	0.550	1336	0.550	1371	0.550	1406	0.550		
1232	0.550	1267	0.550	1302	0.550	1337	0.550	1372	0.550	1407	0.550		

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	1440	90.410	90.065	0.060	0.000	22.001	0.6	SURCHARGED
S8.001	S31	1440	90.390	90.065	0.120	0.000	45.860	0.5	SURCHARGED
S8.002	S32	1440	90.370	90.064	0.159	0.000	51.665	0.8	SURCHARGED
S8.003	S33	1440	90.340	90.063	0.813	0.000	19.857	0.9	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S8.000	S30	1440	90.410	90.348	0.343	0.000	39.697	1.6	SURCHARGED
S8.001	S31	1440	90.390	90.348	0.403	0.000	69.603	2.2	SURCHARGED
S8.002	S32	1440	90.370	90.347	0.442	0.000	74.895	2.8	SURCHARGED
S8.003	S33	1440	90.340	90.346	1.096	5.784	28.463	1.0	FLOOD

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Summary of Critical Results by Maximum Discharge Volume (Rank 1) for PHASE 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Discharge Vol (m³)	Status
S8.003	S33	360	90.340	35.830	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for PHASE 5

« - 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
S9.000	16.692	0.020	834.6	0.067	5.00	0.0	0.600	o	225	Pipe/Conduit	
S10.000	6.154	0.020	307.7	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S10.001	7.218	0.020	360.9	0.031	0.00	0.0	0.600	o	150	Pipe/Conduit	
S10.002	23.523	0.060	392.1	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.003	19.438	0.040	486.0	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.001	11.838	0.050	236.8	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
S9.002	18.219	0.000	0.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S9.003	8.764	0.040	219.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S9.000	66.57	5.63	89.210	0.067	0.0	0.0	0.0	0.44	17.7	12.1
S10.000	69.03	5.18	89.520	0.000	0.0	0.0	0.0	0.57	10.0	0.0
S10.001	67.73	5.41	89.430	0.031	0.0	0.0	0.0	0.52	9.2	5.7
S10.002	64.60	6.01	89.335	0.090	0.0	0.0	0.0	0.65	26.0	15.8
S10.003	61.99	6.56	89.130	0.119	0.0	0.0	0.0	0.59	23.3	19.9
S9.001	61.13	6.76	89.015	0.263	0.0	0.0	0.0	1.02	71.9	43.6
S9.002	53.51	8.79	88.900	0.263	0.0	0.0	0.0	0.15	10.5«	43.6
S9.003	53.07	8.93	88.900	0.263	0.0	0.0	0.0	1.06	74.8	43.6

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PIPELINE SCHEDULES for PHASE 5

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S9.000	o	225	S34	89.950	89.210	0.515	Open Manhole	1200
S10.000	o	150	S35	90.100	89.520	0.430	Junction	
S10.001	o	150	S36	90.100	89.430	0.520	Open Manhole	1200
S10.002	o	225	S37	90.080	89.335	0.520	Open Manhole	1200
S10.003	o	225	S38	90.000	89.130	0.645	Open Manhole	1200
S9.001	o	300	S39	89.950	89.015	0.635	Open Manhole	1200
S9.002	o	300	S40	89.950	88.900	0.750	Open Manhole	1200
S9.003	o	300	S41	89.950	88.900	0.750	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S9.000	16.692	834.6	S39	89.950	89.190	0.535	Open Manhole	1200
S10.000	6.154	307.7	S36	90.100	89.500	0.450	Open Manhole	1200
S10.001	7.218	360.9	S37	90.080	89.410	0.520	Open Manhole	1200
S10.002	23.523	392.1	S38	90.000	89.275	0.500	Open Manhole	1200
S10.003	19.438	486.0	S39	89.950	89.090	0.635	Open Manhole	1200
S9.001	11.838	236.8	S40	89.950	88.965	0.685	Open Manhole	1200
S9.002	18.219	0.0	S41	89.950	88.900	0.750	Open Manhole	1200
S9.003	8.764	219.1	S	89.800	88.860	0.640	Open Manhole	0

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Online Controls for PHASE 5

Hydro-Brake® Optimum Manhole: S41, DS/PN: S9.003, Volume (m³): 2.4

Unit Reference	MD-SHE-0049-1000-0800-1000
Design Head (m)	0.800
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	49
Invert Level (m)	88.900
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	1.0	Kick-Flo®	0.437	0.8
Flush-Flo™	0.215	0.9	Mean Flow over Head Range	-	0.8

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	0.8	1.200	1.2	3.000	1.8	7.000	2.7
0.200	0.9	1.400	1.3	3.500	1.9	7.500	2.8
0.300	0.9	1.600	1.4	4.000	2.1	8.000	2.9
0.400	0.8	1.800	1.4	4.500	2.2	8.500	2.9
0.500	0.8	2.000	1.5	5.000	2.3	9.000	3.0
0.600	0.9	2.200	1.6	5.500	2.4	9.500	3.1
0.800	1.0	2.400	1.6	6.000	2.5		
1.000	1.1	2.600	1.7	6.500	2.6		

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Storage Structures for PHASE 5

Porous Car Park Manhole: S34, DS/PN: S9.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	33.0
Max Percolation (l/s)	91.7	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.210	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S36, DS/PN: S10.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	27.8	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.500	Cap Volume Depth (m)	0.440

Porous Car Park Manhole: S37, DS/PN: S10.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	38.0
Max Percolation (l/s)	105.6	Slope (1:X)	390.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.430	Cap Volume Depth (m)	0.440

Porous Car Park Manhole: S38, DS/PN: S10.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	69.4	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.275	Cap Volume Depth (m)	0.440

Porous Car Park Manhole: S39, DS/PN: S9.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	26.0
Max Percolation (l/s)	72.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	89.090	Cap Volume Depth (m)	0.440

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Cellular Storage Manhole: S41, DS/PN: S9.003

Invert Level (m) 88.900 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	80.0	15.0	0.801	0.0	21.4
0.800	80.0	21.4			

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	120	89.950	89.280	-0.155	0.000	3.023	2.2	OK
S10.000	S35	15	90.100	89.520	-0.150	0.000	0.000	0.0	OK*
S10.001	S36	15	90.100	89.508	-0.072	0.000	0.119	3.9	OK
S10.002	S37	15	90.080	89.439	-0.121	0.000	0.158	10.3	OK
S10.003	S38	30	90.000	89.267	-0.088	0.000	0.170	13.1	OK
S9.001	S39	960	89.950	89.215	-0.100	0.000	8.273	3.6	OK
S9.002	S40	960	89.950	89.216	0.016	0.000	0.920	3.5	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Maximum Vol (m^3)	Pipe Flow (l/s)	Status
S9.003	S41	960	89.950	89.214	0.014	0.000	25.320	0.9	SURCHARGED

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	60	89.950	89.289	-0.146	0.000	3.867	2.8	OK
S10.000	S35	15	90.100	89.520	-0.150	0.000	0.000	0.0	OK*
S10.001	S36	15	90.100	89.517	-0.063	0.000	0.226	4.6	OK
S10.002	S37	15	90.080	89.450	-0.110	0.000	0.380	12.4	OK
S10.003	S38	15	90.000	89.284	-0.071	0.000	0.240	15.7	OK
S9.001	S39	960	89.950	89.262	-0.053	0.000	12.246	3.6	OK
S9.002	S40	960	89.950	89.262	0.062	0.000	1.063	3.5	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.003	S41	960	89.950	89.260	0.060	0.000	28.930	0.9	SURCHARGED

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	960	89.950	89.453	0.018	0.000	20.280	1.3	SURCHARGED
S10.000	S35	15	90.100	89.584	-0.086	0.000	0.059	0.2	OK*
S10.001	S36	15	90.100	89.586	0.006	0.000	2.289	9.8	SURCHARGED
S10.002	S37	15	90.080	89.516	-0.044	0.000	4.611	23.8	OK
S10.003	S38	960	90.000	89.454	0.099	0.000	11.221	2.8	SURCHARGED
S9.001	S39	960	89.950	89.453	0.138	0.000	28.100	3.3	SURCHARGED
S9.002	S40	960	89.950	89.472	0.272	0.000	1.393	4.0	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.003	S41	960	89.950	89.451	0.251	0.000	43.731	0.9	SURCHARGED

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	960	89.950	89.558	0.123	0.000	30.731	1.4	SURCHARGED
S10.000	S35	15	90.100	89.626	-0.044	0.000	0.101	0.2	OK*
S10.001	S36	15	90.100	89.629	0.049	0.000	3.664	14.8	SURCHARGED
S10.002	S37	15	90.080	89.563	0.003	0.000	9.976	26.5	SURCHARGED
S10.003	S38	960	90.000	89.558	0.203	0.000	19.462	3.1	SURCHARGED
S9.001	S39	960	89.950	89.557	0.242	0.000	35.815	3.5	SURCHARGED
S9.002	S40	960	89.950	89.581	0.381	0.000	1.517	3.9	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.003	S41	960	89.950	89.555	0.355	0.000	51.745	0.9	SURCHARGED

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	1440	89.950	89.924	0.489	0.000	40.401	1.1	SURCHARGED
S10.000	S35	15	90.100	89.670	0.000	0.000	0.169	0.3	SURCHARGED*
S10.001	S36	1440	90.100	89.817	0.237	0.000	9.537	1.0	SURCHARGED
S10.002	S37	1440	90.080	89.818	0.258	0.000	39.278	2.8	SURCHARGED
S10.003	S38	1440	90.000	89.937	0.582	0.000	34.795	2.4	SURCHARGED
S9.001	S39	1440	89.950	89.927	0.612	0.000	36.687	3.4	SURCHARGED
S9.002	S40	1440	89.950	89.950	0.750	0.157	1.941	3.4	FLOOD

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.003	S41	2160	89.950	89.950	0.750	0.460	63.440	1.0	FLOOD

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Surcharged Outfall Details for PHASE 5

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S9.003	S	89.800	88.860	0.000	0	0

Datum (m) 89.160 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.700	37	0.700	73	0.700	109	0.700	145	0.700	181	0.700	217	0.700
2	0.700	38	0.700	74	0.700	110	0.700	146	0.700	182	0.700	218	0.700
3	0.700	39	0.700	75	0.700	111	0.700	147	0.700	183	0.700	219	0.700
4	0.700	40	0.700	76	0.700	112	0.700	148	0.700	184	0.700	220	0.700
5	0.700	41	0.700	77	0.700	113	0.700	149	0.700	185	0.700	221	0.700
6	0.700	42	0.700	78	0.700	114	0.700	150	0.700	186	0.700	222	0.700
7	0.700	43	0.700	79	0.700	115	0.700	151	0.700	187	0.700	223	0.700
8	0.700	44	0.700	80	0.700	116	0.700	152	0.700	188	0.700	224	0.700
9	0.700	45	0.700	81	0.700	117	0.700	153	0.700	189	0.700	225	0.700
10	0.700	46	0.700	82	0.700	118	0.700	154	0.700	190	0.700	226	0.700
11	0.700	47	0.700	83	0.700	119	0.700	155	0.700	191	0.700	227	0.700
12	0.700	48	0.700	84	0.700	120	0.700	156	0.700	192	0.700	228	0.700
13	0.700	49	0.700	85	0.700	121	0.700	157	0.700	193	0.700	229	0.700
14	0.700	50	0.700	86	0.700	122	0.700	158	0.700	194	0.700	230	0.700
15	0.700	51	0.700	87	0.700	123	0.700	159	0.700	195	0.700	231	0.700
16	0.700	52	0.700	88	0.700	124	0.700	160	0.700	196	0.700	232	0.700
17	0.700	53	0.700	89	0.700	125	0.700	161	0.700	197	0.700	233	0.700
18	0.700	54	0.700	90	0.700	126	0.700	162	0.700	198	0.700	234	0.700
19	0.700	55	0.700	91	0.700	127	0.700	163	0.700	199	0.700	235	0.700
20	0.700	56	0.700	92	0.700	128	0.700	164	0.700	200	0.700	236	0.700
21	0.700	57	0.700	93	0.700	129	0.700	165	0.700	201	0.700	237	0.700
22	0.700	58	0.700	94	0.700	130	0.700	166	0.700	202	0.700	238	0.700
23	0.700	59	0.700	95	0.700	131	0.700	167	0.700	203	0.700	239	0.700
24	0.700	60	0.700	96	0.700	132	0.700	168	0.700	204	0.700	240	0.700
25	0.700	61	0.700	97	0.700	133	0.700	169	0.700	205	0.700	241	0.700
26	0.700	62	0.700	98	0.700	134	0.700	170	0.700	206	0.700	242	0.700
27	0.700	63	0.700	99	0.700	135	0.700	171	0.700	207	0.700	243	0.700
28	0.700	64	0.700	100	0.700	136	0.700	172	0.700	208	0.700	244	0.700
29	0.700	65	0.700	101	0.700	137	0.700	173	0.700	209	0.700	245	0.700
30	0.700	66	0.700	102	0.700	138	0.700	174	0.700	210	0.700	246	0.700
31	0.700	67	0.700	103	0.700	139	0.700	175	0.700	211	0.700	247	0.700
32	0.700	68	0.700	104	0.700	140	0.700	176	0.700	212	0.700	248	0.700
33	0.700	69	0.700	105	0.700	141	0.700	177	0.700	213	0.700	249	0.700
34	0.700	70	0.700	106	0.700	142	0.700	178	0.700	214	0.700	250	0.700
35	0.700	71	0.700	107	0.700	143	0.700	179	0.700	215	0.700	251	0.700
36	0.700	72	0.700	108	0.700	144	0.700	180	0.700	216	0.700	252	0.700

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Surcharged Outfall Details for PHASE 5

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
253	0.700	298	0.700	343	0.700	388	0.700	433	0.700	478	0.700	523	0.700
254	0.700	299	0.700	344	0.700	389	0.700	434	0.700	479	0.700	524	0.700
255	0.700	300	0.700	345	0.700	390	0.700	435	0.700	480	0.700	525	0.700
256	0.700	301	0.700	346	0.700	391	0.700	436	0.700	481	0.700	526	0.700
257	0.700	302	0.700	347	0.700	392	0.700	437	0.700	482	0.700	527	0.700
258	0.700	303	0.700	348	0.700	393	0.700	438	0.700	483	0.700	528	0.700
259	0.700	304	0.700	349	0.700	394	0.700	439	0.700	484	0.700	529	0.700
260	0.700	305	0.700	350	0.700	395	0.700	440	0.700	485	0.700	530	0.700
261	0.700	306	0.700	351	0.700	396	0.700	441	0.700	486	0.700	531	0.700
262	0.700	307	0.700	352	0.700	397	0.700	442	0.700	487	0.700	532	0.700
263	0.700	308	0.700	353	0.700	398	0.700	443	0.700	488	0.700	533	0.700
264	0.700	309	0.700	354	0.700	399	0.700	444	0.700	489	0.700	534	0.700
265	0.700	310	0.700	355	0.700	400	0.700	445	0.700	490	0.700	535	0.700
266	0.700	311	0.700	356	0.700	401	0.700	446	0.700	491	0.700	536	0.700
267	0.700	312	0.700	357	0.700	402	0.700	447	0.700	492	0.700	537	0.700
268	0.700	313	0.700	358	0.700	403	0.700	448	0.700	493	0.700	538	0.700
269	0.700	314	0.700	359	0.700	404	0.700	449	0.700	494	0.700	539	0.700
270	0.700	315	0.700	360	0.700	405	0.700	450	0.700	495	0.700	540	0.700
271	0.700	316	0.700	361	0.700	406	0.700	451	0.700	496	0.700	541	0.700
272	0.700	317	0.700	362	0.700	407	0.700	452	0.700	497	0.700	542	0.700
273	0.700	318	0.700	363	0.700	408	0.700	453	0.700	498	0.700	543	0.700
274	0.700	319	0.700	364	0.700	409	0.700	454	0.700	499	0.700	544	0.700
275	0.700	320	0.700	365	0.700	410	0.700	455	0.700	500	0.700	545	0.700
276	0.700	321	0.700	366	0.700	411	0.700	456	0.700	501	0.700	546	0.700
277	0.700	322	0.700	367	0.700	412	0.700	457	0.700	502	0.700	547	0.700
278	0.700	323	0.700	368	0.700	413	0.700	458	0.700	503	0.700	548	0.700
279	0.700	324	0.700	369	0.700	414	0.700	459	0.700	504	0.700	549	0.700
280	0.700	325	0.700	370	0.700	415	0.700	460	0.700	505	0.700	550	0.700
281	0.700	326	0.700	371	0.700	416	0.700	461	0.700	506	0.700	551	0.700
282	0.700	327	0.700	372	0.700	417	0.700	462	0.700	507	0.700	552	0.700
283	0.700	328	0.700	373	0.700	418	0.700	463	0.700	508	0.700	553	0.700
284	0.700	329	0.700	374	0.700	419	0.700	464	0.700	509	0.700	554	0.700
285	0.700	330	0.700	375	0.700	420	0.700	465	0.700	510	0.700	555	0.700
286	0.700	331	0.700	376	0.700	421	0.700	466	0.700	511	0.700	556	0.700
287	0.700	332	0.700	377	0.700	422	0.700	467	0.700	512	0.700	557	0.700
288	0.700	333	0.700	378	0.700	423	0.700	468	0.700	513	0.700	558	0.700
289	0.700	334	0.700	379	0.700	424	0.700	469	0.700	514	0.700	559	0.700
290	0.700	335	0.700	380	0.700	425	0.700	470	0.700	515	0.700	560	0.700
291	0.700	336	0.700	381	0.700	426	0.700	471	0.700	516	0.700	561	0.700
292	0.700	337	0.700	382	0.700	427	0.700	472	0.700	517	0.700	562	0.700
293	0.700	338	0.700	383	0.700	428	0.700	473	0.700	518	0.700	563	0.700
294	0.700	339	0.700	384	0.700	429	0.700	474	0.700	519	0.700	564	0.700
295	0.700	340	0.700	385	0.700	430	0.700	475	0.700	520	0.700	565	0.700
296	0.700	341	0.700	386	0.700	431	0.700	476	0.700	521	0.700	566	0.700
297	0.700	342	0.700	387	0.700	432	0.700	477	0.700	522	0.700	567	0.700

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Surcharged Outfall Details for PHASE 5

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
568	0.700	613	0.700	658	0.700	703	0.700	748	0.700	793	0.700	838	0.700
569	0.700	614	0.700	659	0.700	704	0.700	749	0.700	794	0.700	839	0.700
570	0.700	615	0.700	660	0.700	705	0.700	750	0.700	795	0.700	840	0.700
571	0.700	616	0.700	661	0.700	706	0.700	751	0.700	796	0.700	841	0.700
572	0.700	617	0.700	662	0.700	707	0.700	752	0.700	797	0.700	842	0.700
573	0.700	618	0.700	663	0.700	708	0.700	753	0.700	798	0.700	843	0.700
574	0.700	619	0.700	664	0.700	709	0.700	754	0.700	799	0.700	844	0.700
575	0.700	620	0.700	665	0.700	710	0.700	755	0.700	800	0.700	845	0.700
576	0.700	621	0.700	666	0.700	711	0.700	756	0.700	801	0.700	846	0.700
577	0.700	622	0.700	667	0.700	712	0.700	757	0.700	802	0.700	847	0.700
578	0.700	623	0.700	668	0.700	713	0.700	758	0.700	803	0.700	848	0.700
579	0.700	624	0.700	669	0.700	714	0.700	759	0.700	804	0.700	849	0.700
580	0.700	625	0.700	670	0.700	715	0.700	760	0.700	805	0.700	850	0.700
581	0.700	626	0.700	671	0.700	716	0.700	761	0.700	806	0.700	851	0.700
582	0.700	627	0.700	672	0.700	717	0.700	762	0.700	807	0.700	852	0.700
583	0.700	628	0.700	673	0.700	718	0.700	763	0.700	808	0.700	853	0.700
584	0.700	629	0.700	674	0.700	719	0.700	764	0.700	809	0.700	854	0.700
585	0.700	630	0.700	675	0.700	720	0.700	765	0.700	810	0.700	855	0.700
586	0.700	631	0.700	676	0.700	721	0.700	766	0.700	811	0.700	856	0.700
587	0.700	632	0.700	677	0.700	722	0.700	767	0.700	812	0.700	857	0.700
588	0.700	633	0.700	678	0.700	723	0.700	768	0.700	813	0.700	858	0.700
589	0.700	634	0.700	679	0.700	724	0.700	769	0.700	814	0.700	859	0.700
590	0.700	635	0.700	680	0.700	725	0.700	770	0.700	815	0.700	860	0.700
591	0.700	636	0.700	681	0.700	726	0.700	771	0.700	816	0.700	861	0.700
592	0.700	637	0.700	682	0.700	727	0.700	772	0.700	817	0.700	862	0.700
593	0.700	638	0.700	683	0.700	728	0.700	773	0.700	818	0.700	863	0.700
594	0.700	639	0.700	684	0.700	729	0.700	774	0.700	819	0.700	864	0.700
595	0.700	640	0.700	685	0.700	730	0.700	775	0.700	820	0.700	865	0.700
596	0.700	641	0.700	686	0.700	731	0.700	776	0.700	821	0.700	866	0.700
597	0.700	642	0.700	687	0.700	732	0.700	777	0.700	822	0.700	867	0.700
598	0.700	643	0.700	688	0.700	733	0.700	778	0.700	823	0.700	868	0.700
599	0.700	644	0.700	689	0.700	734	0.700	779	0.700	824	0.700	869	0.700
600	0.700	645	0.700	690	0.700	735	0.700	780	0.700	825	0.700	870	0.700
601	0.700	646	0.700	691	0.700	736	0.700	781	0.700	826	0.700	871	0.700
602	0.700	647	0.700	692	0.700	737	0.700	782	0.700	827	0.700	872	0.700
603	0.700	648	0.700	693	0.700	738	0.700	783	0.700	828	0.700	873	0.700
604	0.700	649	0.700	694	0.700	739	0.700	784	0.700	829	0.700	874	0.700
605	0.700	650	0.700	695	0.700	740	0.700	785	0.700	830	0.700	875	0.700
606	0.700	651	0.700	696	0.700	741	0.700	786	0.700	831	0.700	876	0.700
607	0.700	652	0.700	697	0.700	742	0.700	787	0.700	832	0.700	877	0.700
608	0.700	653	0.700	698	0.700	743	0.700	788	0.700	833	0.700	878	0.700
609	0.700	654	0.700	699	0.700	744	0.700	789	0.700	834	0.700	879	0.700
610	0.700	655	0.700	700	0.700	745	0.700	790	0.700	835	0.700	880	0.700
611	0.700	656	0.700	701	0.700	746	0.700	791	0.700	836	0.700	881	0.700
612	0.700	657	0.700	702	0.700	747	0.700	792	0.700	837	0.700	882	0.700

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Surcharged Outfall Details for PHASE 5

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
883	0.700	928	0.700	973	0.700	1018	0.700	1063	0.700	1108	0.700	1153	0.700
884	0.700	929	0.700	974	0.700	1019	0.700	1064	0.700	1109	0.700	1154	0.700
885	0.700	930	0.700	975	0.700	1020	0.700	1065	0.700	1110	0.700	1155	0.700
886	0.700	931	0.700	976	0.700	1021	0.700	1066	0.700	1111	0.700	1156	0.700
887	0.700	932	0.700	977	0.700	1022	0.700	1067	0.700	1112	0.700	1157	0.700
888	0.700	933	0.700	978	0.700	1023	0.700	1068	0.700	1113	0.700	1158	0.700
889	0.700	934	0.700	979	0.700	1024	0.700	1069	0.700	1114	0.700	1159	0.700
890	0.700	935	0.700	980	0.700	1025	0.700	1070	0.700	1115	0.700	1160	0.700
891	0.700	936	0.700	981	0.700	1026	0.700	1071	0.700	1116	0.700	1161	0.700
892	0.700	937	0.700	982	0.700	1027	0.700	1072	0.700	1117	0.700	1162	0.700
893	0.700	938	0.700	983	0.700	1028	0.700	1073	0.700	1118	0.700	1163	0.700
894	0.700	939	0.700	984	0.700	1029	0.700	1074	0.700	1119	0.700	1164	0.700
895	0.700	940	0.700	985	0.700	1030	0.700	1075	0.700	1120	0.700	1165	0.700
896	0.700	941	0.700	986	0.700	1031	0.700	1076	0.700	1121	0.700	1166	0.700
897	0.700	942	0.700	987	0.700	1032	0.700	1077	0.700	1122	0.700	1167	0.700
898	0.700	943	0.700	988	0.700	1033	0.700	1078	0.700	1123	0.700	1168	0.700
899	0.700	944	0.700	989	0.700	1034	0.700	1079	0.700	1124	0.700	1169	0.700
900	0.700	945	0.700	990	0.700	1035	0.700	1080	0.700	1125	0.700	1170	0.700
901	0.700	946	0.700	991	0.700	1036	0.700	1081	0.700	1126	0.700	1171	0.700
902	0.700	947	0.700	992	0.700	1037	0.700	1082	0.700	1127	0.700	1172	0.700
903	0.700	948	0.700	993	0.700	1038	0.700	1083	0.700	1128	0.700	1173	0.700
904	0.700	949	0.700	994	0.700	1039	0.700	1084	0.700	1129	0.700	1174	0.700
905	0.700	950	0.700	995	0.700	1040	0.700	1085	0.700	1130	0.700	1175	0.700
906	0.700	951	0.700	996	0.700	1041	0.700	1086	0.700	1131	0.700	1176	0.700
907	0.700	952	0.700	997	0.700	1042	0.700	1087	0.700	1132	0.700	1177	0.700
908	0.700	953	0.700	998	0.700	1043	0.700	1088	0.700	1133	0.700	1178	0.700
909	0.700	954	0.700	999	0.700	1044	0.700	1089	0.700	1134	0.700	1179	0.700
910	0.700	955	0.700	1000	0.700	1045	0.700	1090	0.700	1135	0.700	1180	0.700
911	0.700	956	0.700	1001	0.700	1046	0.700	1091	0.700	1136	0.700	1181	0.700
912	0.700	957	0.700	1002	0.700	1047	0.700	1092	0.700	1137	0.700	1182	0.700
913	0.700	958	0.700	1003	0.700	1048	0.700	1093	0.700	1138	0.700	1183	0.700
914	0.700	959	0.700	1004	0.700	1049	0.700	1094	0.700	1139	0.700	1184	0.700
915	0.700	960	0.700	1005	0.700	1050	0.700	1095	0.700	1140	0.700	1185	0.700
916	0.700	961	0.700	1006	0.700	1051	0.700	1096	0.700	1141	0.700	1186	0.700
917	0.700	962	0.700	1007	0.700	1052	0.700	1097	0.700	1142	0.700	1187	0.700
918	0.700	963	0.700	1008	0.700	1053	0.700	1098	0.700	1143	0.700	1188	0.700
919	0.700	964	0.700	1009	0.700	1054	0.700	1099	0.700	1144	0.700	1189	0.700
920	0.700	965	0.700	1010	0.700	1055	0.700	1100	0.700	1145	0.700	1190	0.700
921	0.700	966	0.700	1011	0.700	1056	0.700	1101	0.700	1146	0.700	1191	0.700
922	0.700	967	0.700	1012	0.700	1057	0.700	1102	0.700	1147	0.700	1192	0.700
923	0.700	968	0.700	1013	0.700	1058	0.700	1103	0.700	1148	0.700	1193	0.700
924	0.700	969	0.700	1014	0.700	1059	0.700	1104	0.700	1149	0.700	1194	0.700
925	0.700	970	0.700	1015	0.700	1060	0.700	1105	0.700	1150	0.700	1195	0.700
926	0.700	971	0.700	1016	0.700	1061	0.700	1106	0.700	1151	0.700	1196	0.700
927	0.700	972	0.700	1017	0.700	1062	0.700	1107	0.700	1152	0.700	1197	0.700

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Surcharged Outfall Details for PHASE 5

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1198	0.700	1233	0.700	1268	0.700	1303	0.700	1338	0.700	1373	0.700	1408	0.700
1199	0.700	1234	0.700	1269	0.700	1304	0.700	1339	0.700	1374	0.700	1409	0.700
1200	0.700	1235	0.700	1270	0.700	1305	0.700	1340	0.700	1375	0.700	1410	0.700
1201	0.700	1236	0.700	1271	0.700	1306	0.700	1341	0.700	1376	0.700	1411	0.700
1202	0.700	1237	0.700	1272	0.700	1307	0.700	1342	0.700	1377	0.700	1412	0.700
1203	0.700	1238	0.700	1273	0.700	1308	0.700	1343	0.700	1378	0.700	1413	0.700
1204	0.700	1239	0.700	1274	0.700	1309	0.700	1344	0.700	1379	0.700	1414	0.700
1205	0.700	1240	0.700	1275	0.700	1310	0.700	1345	0.700	1380	0.700	1415	0.700
1206	0.700	1241	0.700	1276	0.700	1311	0.700	1346	0.700	1381	0.700	1416	0.700
1207	0.700	1242	0.700	1277	0.700	1312	0.700	1347	0.700	1382	0.700	1417	0.700
1208	0.700	1243	0.700	1278	0.700	1313	0.700	1348	0.700	1383	0.700	1418	0.700
1209	0.700	1244	0.700	1279	0.700	1314	0.700	1349	0.700	1384	0.700	1419	0.700
1210	0.700	1245	0.700	1280	0.700	1315	0.700	1350	0.700	1385	0.700	1420	0.700
1211	0.700	1246	0.700	1281	0.700	1316	0.700	1351	0.700	1386	0.700	1421	0.700
1212	0.700	1247	0.700	1282	0.700	1317	0.700	1352	0.700	1387	0.700	1422	0.700
1213	0.700	1248	0.700	1283	0.700	1318	0.700	1353	0.700	1388	0.700	1423	0.700
1214	0.700	1249	0.700	1284	0.700	1319	0.700	1354	0.700	1389	0.700	1424	0.700
1215	0.700	1250	0.700	1285	0.700	1320	0.700	1355	0.700	1390	0.700	1425	0.700
1216	0.700	1251	0.700	1286	0.700	1321	0.700	1356	0.700	1391	0.700	1426	0.700
1217	0.700	1252	0.700	1287	0.700	1322	0.700	1357	0.700	1392	0.700	1427	0.700
1218	0.700	1253	0.700	1288	0.700	1323	0.700	1358	0.700	1393	0.700	1428	0.700
1219	0.700	1254	0.700	1289	0.700	1324	0.700	1359	0.700	1394	0.700	1429	0.700
1220	0.700	1255	0.700	1290	0.700	1325	0.700	1360	0.700	1395	0.700	1430	0.700
1221	0.700	1256	0.700	1291	0.700	1326	0.700	1361	0.700	1396	0.700	1431	0.700
1222	0.700	1257	0.700	1292	0.700	1327	0.700	1362	0.700	1397	0.700	1432	0.700
1223	0.700	1258	0.700	1293	0.700	1328	0.700	1363	0.700	1398	0.700	1433	0.700
1224	0.700	1259	0.700	1294	0.700	1329	0.700	1364	0.700	1399	0.700	1434	0.700
1225	0.700	1260	0.700	1295	0.700	1330	0.700	1365	0.700	1400	0.700	1435	0.700
1226	0.700	1261	0.700	1296	0.700	1331	0.700	1366	0.700	1401	0.700	1436	0.700
1227	0.700	1262	0.700	1297	0.700	1332	0.700	1367	0.700	1402	0.700	1437	0.700
1228	0.700	1263	0.700	1298	0.700	1333	0.700	1368	0.700	1403	0.700	1438	0.700
1229	0.700	1264	0.700	1299	0.700	1334	0.700	1369	0.700	1404	0.700	1439	0.700
1230	0.700	1265	0.700	1300	0.700	1335	0.700	1370	0.700	1405	0.700	1440	0.700
1231	0.700	1266	0.700	1301	0.700	1336	0.700	1371	0.700	1406	0.700		
1232	0.700	1267	0.700	1302	0.700	1337	0.700	1372	0.700	1407	0.700		

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	1440	89.950	89.839	0.404	0.000	40.306	0.6	SURCHARGED
S10.000	S35	1440	90.100	89.670	0.000	0.000	0.191	0.0	SURCHARGED*
S10.001	S36	1440	90.100	89.730	0.150	0.000	6.816	1.1	SURCHARGED
S10.002	S37	1440	90.080	89.728	0.168	0.000	28.948	3.0	SURCHARGED
S10.003	S38	1440	90.000	89.733	0.378	0.000	32.662	1.9	SURCHARGED
S9.001	S39	1440	89.950	89.892	0.577	0.000	36.647	2.1	SURCHARGED
S9.002	S40	1440	89.950	89.931	0.731	0.000	1.913	2.1	SURCHARGED

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.003	S41	1440	89.950	89.950	0.750	0.053	63.251	0.9	FLOOD

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

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.000	S34	2160	89.950	89.960	0.525	9.992	50.422	1.6	FLOOD
S10.000	S35	15	90.100	89.670	0.000	0.000	0.169	0.3	SURCHARGED*
S10.001	S36	2160	90.100	89.962	0.382	0.000	13.836	0.7	SURCHARGED
S10.002	S37	2160	90.080	89.962	0.402	0.000	50.950	1.7	SURCHARGED
S10.003	S38	2160	90.000	89.961	0.606	0.000	34.822	1.7	SURCHARGED
S9.001	S39	2160	89.950	89.959	0.644	9.499	46.206	1.9	FLOOD
S9.002	S40	2160	89.950	89.959	0.759	8.761	10.695	1.6	FLOOD

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

PN	US/MH Name	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S9.003	S41	1440	89.950	89.958	0.758	7.820	71.028	1.0	FLOOD

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Summary of Critical Results by Maximum Discharge Volume (Rank 1) for PHASE 5

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 446250 240000 SP 46250 40000
C (1km)	-0.024
D1 (1km)	0.315
D2 (1km)	0.333
D3 (1km)	0.249
E (1km)	0.301
F (1km)	2.480
Cv (Summer)	0.900
Cv (Winter)	0.900

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Duration (mins)	US/CL (m)	Discharge Vol (m³)	Status
S9.003	S41	360	89.950	33.930	SURCHARGED

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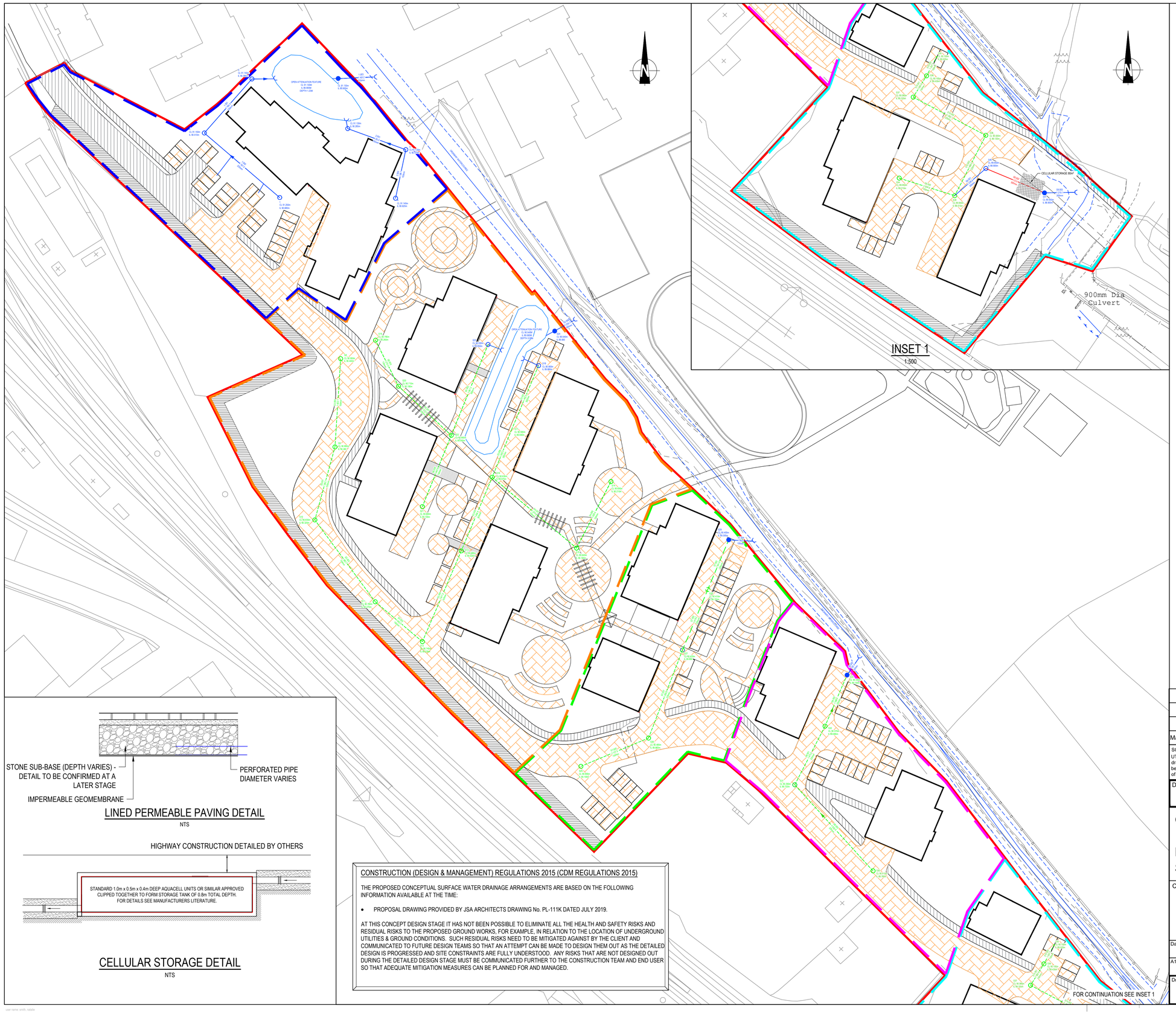

INSET 1

1:500

KEY:

- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED SURFACE WATER MANHOLE
- FLOW CONTROL MANHOLE
- PROPOSED SURFACE WATER MANHOLE MODEL ONLY SEE NOTE 6
- PROPOSED PERFORATED PIPE
- DUMMY PIPE FOR MODELLING PURPOSE ONLY
- TOP OF BANK
- PROPOSED PERMEABLE PAVING
- MAIN FOOTPATH AND ADOPTABLE ROAD - IMPERMEABLE SURFACE
- SOUND BUND
- HEADWALL
- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PHASE 5
- SITE BOUNDARY

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN UNLESS NOTED OTHERWISE.
3. ALL COORDINATES ARE IN METRES RELATIVE TO ORDNANCE SURVEY NATIONAL GRID.
4. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK OR PREPARING SHOP DRAWINGS.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS AND ARCHITECTS DRAWINGS AND SPECIFICATIONS.
6. MODEL NODES ARE FROM MICRODRAINAGE FOR THE INCLUSION OF IMPEREABLE AREA AND ATTENUATION FEATURES WITHIN THE DRAINAGE MODEL AND WILL NOT BE CONSTRUCTED.
7. PROPOSED GROUND LEVELS SUBJECT TO FINALISATION AT THE DETAILED PLANNING STAGE.

LINED PERMEABLE PAVING DETAIL

NTS

CELLULAR STORAGE DETAIL

NTS

CONSTRUCTION (DESIGN & MANAGEMENT) REGULATIONS 2015 (CDM REGULATIONS 2015)

THE PROPOSED CONCEPTUAL SURFACE WATER DRAINAGE ARRANGEMENTS ARE BASED ON THE FOLLOWING INFORMATION AVAILABLE AT THE TIME:

- PROPOSAL DRAWING PROVIDED BY JSA ARCHITECTS DRAWING No. PL-111K DATED JULY 2019.

AT THIS CONCEPT DESIGN STAGE IT HAS NOT BEEN POSSIBLE TO ELIMINATE ALL THE HEALTH AND SAFETY RISKS AND RESIDUAL RISKS TO THE PROPOSED GROUND WORKS, FOR EXAMPLE, IN RELATION TO THE LOCATION OF UNDERGROUND UTILITIES & GROUND CONDITIONS. SUCH RESIDUAL RISKS NEED TO BE MITIGATED AGAINST BY THE CLIENT AND COMMUNICATED TO FUTURE DESIGN TEAMS SO THAT AN ATTEMPT CAN BE MADE TO DESIGN THEM OUT AS THE DETAILED DESIGN IS PROGRESSED AND SITE CONSTRAINTS ARE FULLY UNDERSTOOD. ANY RISKS THAT ARE NOT DESIGNED OUT DURING THE DETAILED DESIGN STAGE MUST BE COMMUNICATED FURTHER TO THE CONSTRUCTION TEAM AND END USER SO THAT ADEQUATE MITIGATION MEASURES CAN BE PLANNED FOR AND MANAGED.

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status

FOR PLANNING

GRUNDON BANBURY

PROPOSED SURFACE WATER DRAINAGE STRATEGY

Client

GRUNDON

Date of 1st Issue	Designed	Drawn
29/10/20	EE	NS
A1 Scale	Checked	Approved
1:500	EE	JNP

Drawing Number: 49730/4001/001

Revision: -

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