

HOLCOMBE MILL, RAMSBOTTOM

DRAINAGE ASSESSMENT

Final Report v1.0

August 2020

Report Title	Holcombe Mill, Ramsbottom Drainage Assessment Final Report v1.0
Client	Eccleston Homes
Date of issue	7 August 2020

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1 INTRODUCTION

1.1 PURPOSE OF REPORT

Weetwood Services Ltd ('Weetwood') has been instructed by Ecclestone Homes to prepare a Drainage Assessment (DA) report to accompany a planning application for the proposed redevelopment of Holcombe Mill, Ramsbottom.

The assessment has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF) updated on 19 February 2019 and the National Planning Practice Guidance (NPPG) updated on 1 October 2019.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows:

Section 1	Introduction and report structure
Section 2	Provides background information relating to the development site, the development proposals, ground conditions and existing site access arrangements
Section 3	Presents national and local drainage planning policy
Section 4	Addresses the effect of the proposed development on surface water runoff and presents an illustrative surface water drainage scheme to ensure that surface water runoff is sustainably managed and flood risk is not increased elsewhere
Section 5	Presents a summary of key findings

1.3 RELEVANT DOCUMENTS

The assessment has been informed by the following documents:

- Bury Local Plan Topic Paper 6 Flood Risk, Bury Council, October 2018
- Bury Local Flood Risk Management Strategy, Bury Council, April 2018
- Surface Water Management Plan Stage 1 – A Strategic Assessment of Surface Water Flood Risk, Association of Greater Manchester Authorities (AGMA), January 2012
- Preliminary Flood Risk Assessment, Bury Council, May 2011
- Level 2 Strategic Flood Risk Assessment (SFRA), Bury, Rochdale and Oldham, November 2009
- Level 1 SFRA, Association of Greater Manchester Authorities, August 2008
- Bury Unitary Development Plan, Bury Council, August 1997

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 SITE LOCATION

The approximately 2.85 hectare (ha) site is located to the south of Bridge Street at the former Holcombe Mill, at Ordnance Survey National Grid Reference SD 793 167, as shown in **Figure 1**.

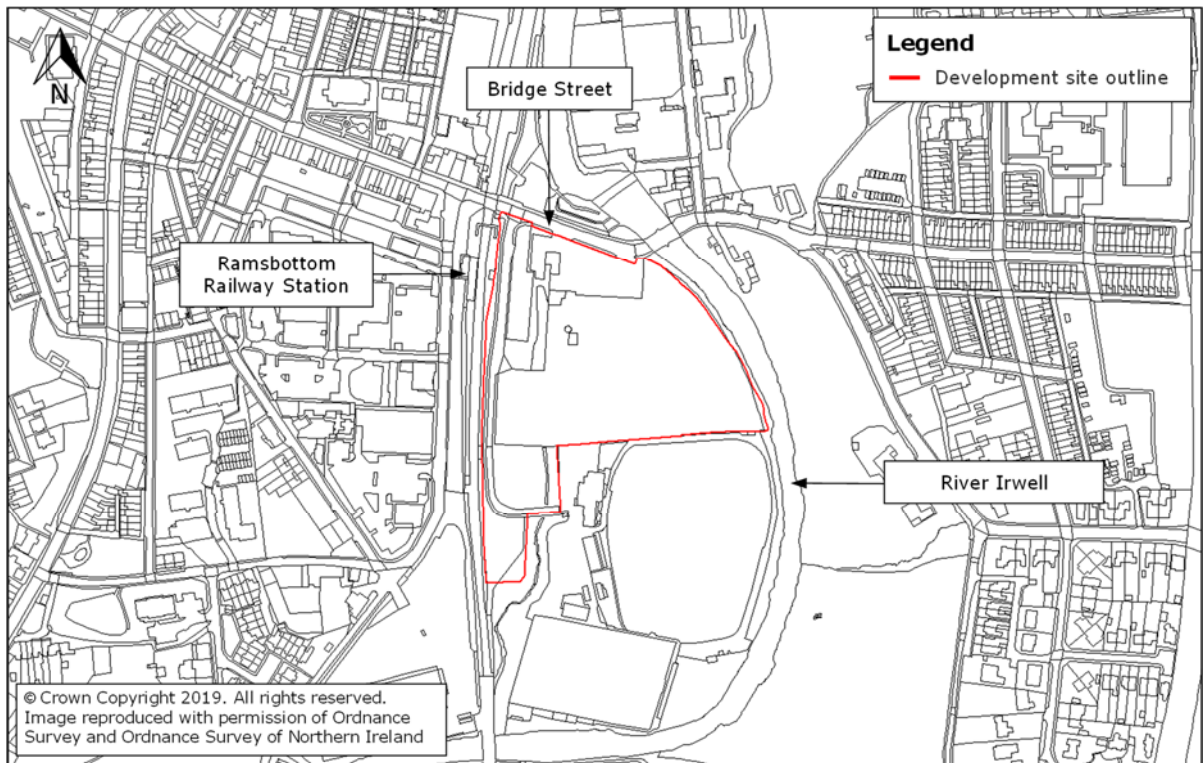


Figure 1: Site Location

2.2 EXISTING AND PROPOSED DEVELOPMENT

The existing site comprises derelict land previously occupied by the Mondi/Holcombe Paper Mill. The mill was demolished in 2012 and all that remains are 3 no. small buildings and the industrial chimney.

The development proposals are for the erection of 67 new residential dwellings, refurbishment of 2 existing buildings to provide 5 residential dwellings, retention of the chimney and demolition of final derelict building (**Appendix A**).

The NPPG classifies residential development as more vulnerable land use.

2.3 WATERBODIES IN THE VICINITY OF THE SITE

The River Irwell flows in a principally southerly direction in the vicinity of the site and flows directly around the eastern boundary of the site. The River Irwell is classified as a main river.

A mill-race previously flowed through the western portion of the site. The inlet to the mill race is understood to have been sealed and the mill race is therefore only expected to convey flows resulting from direct rainfall or floodwaters entering the site overland.

2.4 GROUND CONDITIONS

British Geological Survey (BGS) Surface Geology mapping¹ indicates that the bedrock underlying the site comprises mudstone and siltstone of the Marsden Formation, which is overlain by clay, silt, sand and gravel (alluvium).

The intrusive ground investigation undertaken by Betts Geo Environmental Ltd indicates that the site is underlain by made ground with deposits of clay, silt, sand and gravel generally encountered between 1.3 and 3.0 metres below ground level (m bgl).

Groundwater was encountered within a number of the exploratory holes between 2.6 and 4.0 m bgl.

DEFRA mapping classifies the bedrock and superficial deposits at the site as Secondary A aquifers. The site is not shown to be located within a designated Groundwater Source Protection Zone.

2.5 SITE LEVELS

A topographic survey of the site has been undertaken by Urban Contours Ltd and is provided in **Appendix B**.

Site levels are generally shown to fall from west to east with levels ranging between approximately 127.8 and 124.7 metres Above Ordnance Datum (m AOD).

Two large material stockpiles appear to be present in the south-west corner of the site with crest levels ranging between 130.2 and 129.1 m AOD.

2.6 ACCESS AND EGRESS

Vehicular access to the site is provided along its northern boundary via Bridge Street.

¹ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

3 PLANNING POLICY AND GUIDANCE

3.1 NATIONAL PLANNING POLICY AND GUIDANCE

NPPF Paragraph 163 states that development should only be allowed in areas at risk of flooding if it incorporates sustainable drainage systems unless there is clear evidence that this would be inappropriate whilst NPPF Paragraph 165 states that applications for major developments should incorporate sustainable drainage systems to appropriate operational standards and with maintenance arrangements in place unless there is clear evidence that this would be inappropriate.

Non-statutory technical standards for sustainable drainage published by DEFRA in March 2015 set out how surface water runoff generated during the present day 1 in 30 and 1 in 100 AEP rainfall events and for events exceeding the present day 1 in 100 AEP event should be managed, how peak runoff rates should be restricted and how runoff volumes should be controlled.

3.2 LOCAL PLANNING POLICY AND GUIDANCE

3.2.1 Adopted Bury Unitary Development Plan, 1997

The Bury Unitary Development Plan (UDP) was adopted by Bury Metropolitan Borough Council (MBC) on 29 August 1997. Bury MBC is now working to replace the adopted UDP with a new document called the Bury Local Plan. Until the new Local Plan is produced the UDP will continue to be used to make planning decisions.

The following policies are relevant in respect of drainage:

EN5/1 - New Development and Flood Risk

The Council will not permit new development, including the raising of land and the intensification of development, where such development would be at risk from flooding, would be likely to increase the risk of flooding elsewhere, or would adversely affect river flood defences. When assessing proposals against this policy, the following criteria will apply:

- *the impact on the floodplain;*
- *the increase in surface water run-off as a result of the proposal;*
- *the impact on fluvial flood defences;*
- *the incorporation of mitigating works.*

EN7/5 - Waste Water Management

In seeking to limit surface water pollution the Council will not permit development which:

- *does not have satisfactory arrangements for the disposal of foul sewage, trade effluent and contaminated surface water;*
- *will exacerbate existing problems, such as premature or increased frequency of discharges through storm sewer overflows due to inadequate infrastructure or lack of sewer capacity;*
- *would present an unacceptable risk of spillage or leakage of stored oil/chemicals or other potentially polluting substances.*

3.2.2 Bury Local Plan

Bury MBC has commenced preparation of a new Local Plan. The Local Plan will set out a range of planning policies that will seek to support or restrict development up to 2035 and will zone land for specific uses. Once adopted, it will replace the Bury UDP.

3.3 ENVIRONMENTAL PERMITTING AND LAND DRAINAGE CONSENT

Under the Environmental Permitting (England and Wales) Regulations 2016 an Environmental Permit for Flood Risk Activities² is required from the Environment Agency for any permanent or temporary works:

- In, over or under a designated main river
- Within 8 m of the top of bank of a designated main river or of the landward toe of a flood defence (16 m if it is a tidal main river)

In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities. A permit is separate to and in addition to any planning permission granted.

Land drainage consent may be required from the lead local flood authority or drainage board for work to an ordinary watercourse.

Undertaking activities controlled by local byelaws also requires the relevant consent.

² <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

4 SURFACE WATER MANAGEMENT

4.1 SURFACE WATER DRAINAGE AT THE EXISTING SITE

Gullies are present along the existing access road, indicating that approximately 0.187 ha of the existing site is served by a formal surface water drainage system. The drainage system is expected to outfall to the River Irwell south-east of the site.

An additional 2.087 ha of the site is shown to comprise areas of hardstanding and is believed to have been served by a formal surface water drainage system prior to demolition of the Mondi/Holcombe Paper Mill in 2012. Surface water runoff generated across the areas of hardstanding would now be expected to flow overland to the River Irwell.

The remaining 0.580 ha of the site comprises areas of short grass and woodland.

4.1.1 Existing Runoff Rates

The greenfield runoff rates for the undeveloped parts of the site have been calculated using the ICP SUDS method within MicroDrainage and from existing impermeable areas using the Modified Rational Method. The calculated runoff rates are presented in **Table 1** and details of the input parameters and the output results are provided in **Appendix C** and **Appendix D** respectively.

Table 1: Peak Runoff Rate - Existing Site

Annual probability of rainfall event	Permeable runoff rate 0.580 ha (l/s)	Impermeable runoff rate 2.274 ha (l/s)	Total (l/s)
1:1	5.6	203.5	209.1
1:30	11.0	497.8	508.8
1:100	13.4	640.3	653.7

4.2 SURFACE WATER DRAINAGE AT THE REDEVELOPED SITE

4.2.1 Disposal of Surface Water

In accordance with the NPPG³, surface water runoff should be disposed of according to the following hierarchy: Into the ground (infiltration); To a surface water body; To a surface water sewer, highway drain, or another drainage system; To a combined sewer.

The disposal of surface water by infiltration is not considered to be feasible at the site given the presence of made ground and shallow groundwater. As such, it is proposed to discharge surface water to the existing mill race, which ultimately discharges to the River Irwell.

4.2.2 Post Development Impermeable Area

The area of impermeable surfaces at the redeveloped site has been estimated to be 1.302 ha based upon the proposed site layout. This is a 0.972 ha reduction in impermeable surfaces compared to the existing site and would result in a significant reduction in the volume of surface water being discharged from the developed site.

³ Paragraph 080, Reference ID: 7-080-20150323

4.2.3 Peak Flow Control

It is proposed to restrict the maximum rate at which surface water is discharged from the developed site to 142.5 l/s, a 30% reduction in the existing peak runoff rate from impermeable surfaces during the 1:1 annual probability storm event.

The modelled surface water discharge rates from the redeveloped site for a range of annual probability events are presented in **Table 2**. The proposals reduce the maximum rate at which surface water leaves the site by a minimum of 52.5% in the 1:1 annual probability event and a maximum of 77.7% in the 1:100 annual probability event, even when considering a 40% increase in rainfall intensity in order to allow for climate change.

Table 2: Peak Discharge Rate - Redeveloped Site

Annual probability of rainfall event	Discharge Rate (l/s)	Reduction (%)
1:1	96.6	52.5
1:30	139.6	72.0
1:100 (+40% climate change)	142.5	77.7

4.2.4 Attenuation Storage

Attenuation storage will be provided within the proposed pipe network, as presented by the preliminary surface water drainage layout provided in **Appendix E**.

The proposed surface water drainage network has been modelled using MicroDrainage and has been designed to manage the 1:100 annual probability rainfall event, including a 40% increase in rainfall intensity to allow for climate change⁴, below ground (**Appendix F**).

4.2.5 Quality Treatment

Water quality treatment will be provided by discharging surface water to the existing mill race located at the site. The mill race will effectively function as a swale because it no longer receives flows from the River Irwell. Additional SuDS features, such as permeable paving may be incorporated into the surface water drainage strategy at the detailed design stage to provide additional water quality treatment.

4.2.6 Exceedance Routes

Flows resulting from rainfall in excess of the 1:100 annual probability rainfall plus climate change event will be managed in exceedance routes. Flood flows will be directed towards carriageways, with the site being profiled to ensure that flood flows are directed away from built development.

4.2.7 Adoption and Maintenance of SuDS

The pipe network, designed in accordance with the Water UK Design and Construction Guidance document (March 2020), may be adopted by the sewerage undertaker.

An indicative maintenance schedule is presented in **Table 3**.

⁴ Flood Risk Assessments: climate change allowances (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>)

Table 3: Maintenance Requirements

Schedule	Required action	Frequency
Mill Race		
Regular maintenance	Remove litter and debris	Monthly, or as required
	Manage vegetation and remove nuisance plants	As required
	Inspect inlets and outlets for blockages, and clear if required	Monthly
Remedial actions	Repair erosion or other damage	As required
	Remove and dispose of oil or petrol residues using safe standard practices	As required
	Remove build-up of sediment	As required
Gullies, Manholes and Pipework		
Regular maintenance	Trapped gullies, manholes and catchpits to be inspected and cleared if necessary	Every three months for first year, bi-annually thereafter
	Inspect drainage runs and jet if necessary	Annually
Permeable Paving		
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies accumulation rates and establish appropriate removal frequencies	Annually
	Monitor inspection chambers	

5 SUMMARY

This report has been prepared on behalf of Eccleston Homes to accompany a planning application for the proposed redevelopment of Holcombe Mill, Ramsbottom.

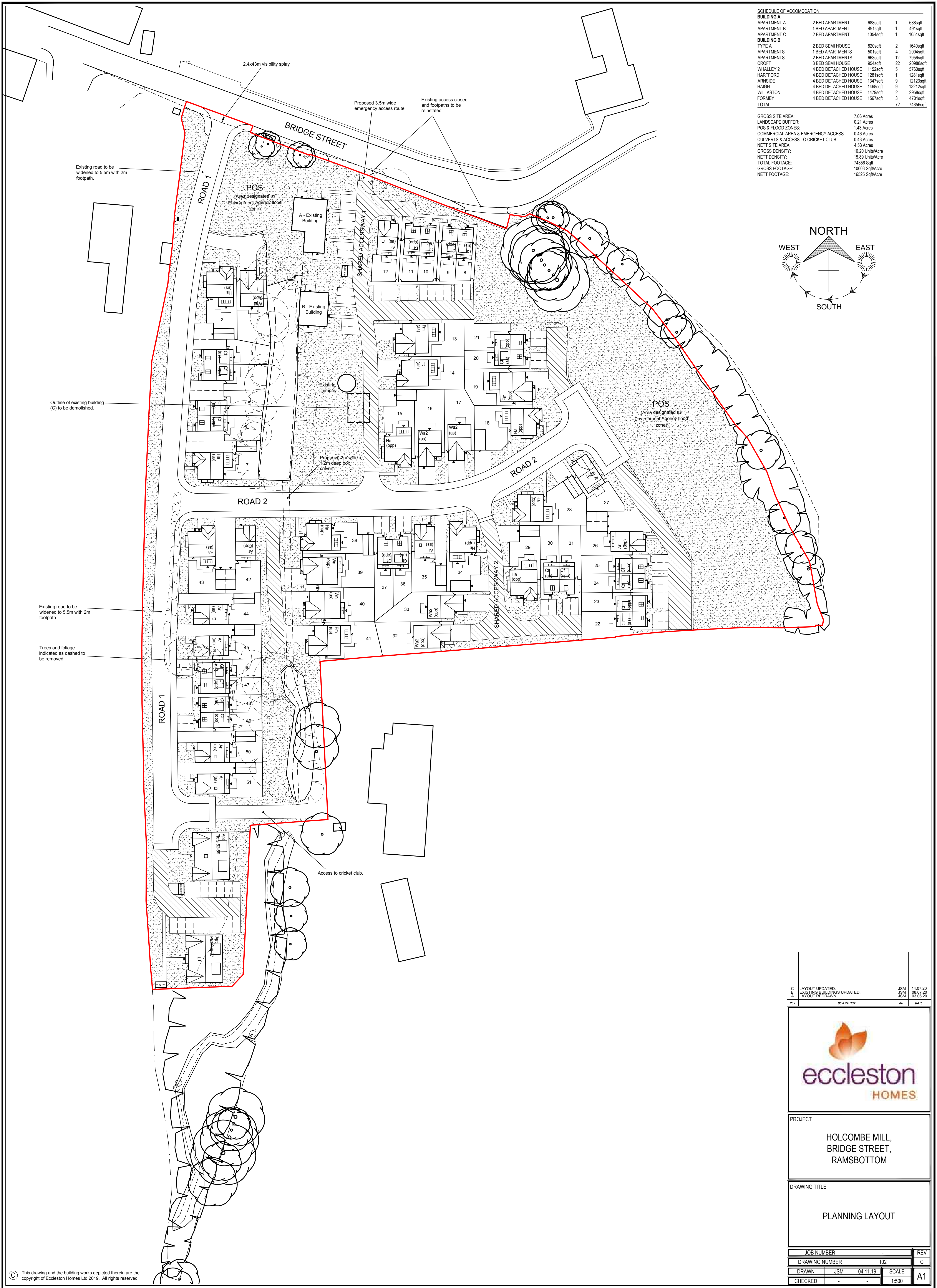
The development proposals are for the erection of 67 new residential dwellings, refurbishment of 2 existing buildings to provide 5 residential dwellings, retention of the chimney and demolition of final derelict building.

Surface water will be discharged to the existing mill race at the site, with the discharge rate restricted to a maximum of 70% of the existing 1:1 annual probability impermeable runoff rate. Attenuation storage will be provided within the proposed pipe network, with water quality treatment provided by the disused mill race, acting as a swale.

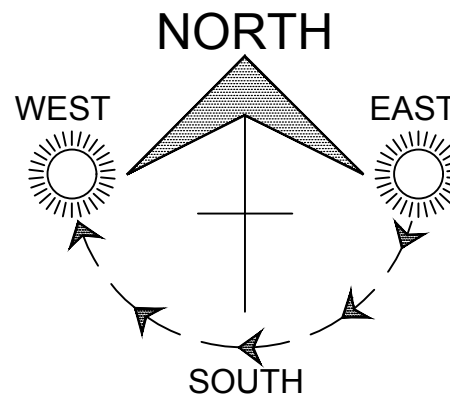
It is expected that the proposed drainage system will be offered for adoption by the sewerage undertaker and an indicative maintenance schedule is provided.

Based upon the above, surface water runoff from the developed site can be sustainably managed in accordance with planning policy and the proposals provide significant betterment when compared to the existing situation.

APPENDIX A:	Development Proposals
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SCHEDULE OF ACCOMMODATION					
BUILDING A					
APARTMENT A	2 BED APARTMENT	688sqft	1	688sqft	
APARTMENT B	1 BED APARTMENT	491sqft	1	491sqft	
APARTMENT C	2 BED APARTMENT	1054sqft	1	1054sqft	
BUILDING B					
TYPE A	2 BED SEMI HOUSE	820sqft	2	1640sqft	
APARTMENTS	1 BED APARTMENTS	501sqft	4	2004sqft	
APARTMENTS	2 BED APARTMENTS	663sqft	12	7956sqft	
CROFT	3 BED SEMI HOUSE	954sqft	22	20988sqft	
WHALLEY 2	4 BED DETACHED HOUSE	1152sqft	5	5760sqft	
HARTFORD	4 BED DETACHED HOUSE	1281sqft	1	1281sqft	
ARNcliffe	4 BED DETACHED HOUSE	1347sqft	9	12123sqft	
HAIGH	4 BED DETACHED HOUSE	1468sqft	9	13212sqft	
WILLASTON	4 BED DETACHED HOUSE	1479sqft	2	2958sqft	
FORMBY	4 BED DETACHED HOUSE	1567sqft	3	4701sqft	
TOTAL			72	74856sqft	
GROSS SITE AREA:					
		7.06 Acres			
LANDSCAPE BUFFER:		0.21 Acres			
POS & FLOOD ZONES:		1.43 Acres			
COMMERCIAL AREA & EMERGENCY ACCESS:		0.46 Acres			
CULVERTS & ACCESS TO CRICKET CLUB:		0.43 Acres			
NETT SITE AREA:		4.53 Acres			
GROSS DENSITY:		10.20 Units/Acre			
NETT DENSITY:		15.89 Units/Acre			
TOTAL FOOTAGE:		74856 Sqft			
GROSS FOOTAGE:		10603 Sqft/Acre			
NETT FOOTAGE:		16525 Sqft/Acre			



C
B
A

LAYOUT UPDATED.
EXISTING BUILDINGS UPDATED.
LAYOUT REDRAWN.

JSM
JSM
JSM

14.07.20
08.07.20
03.06.20

REV	DESCRIPTION	DATE
1	LAYOUT REDRAWN.	03.06.20

PROJECT

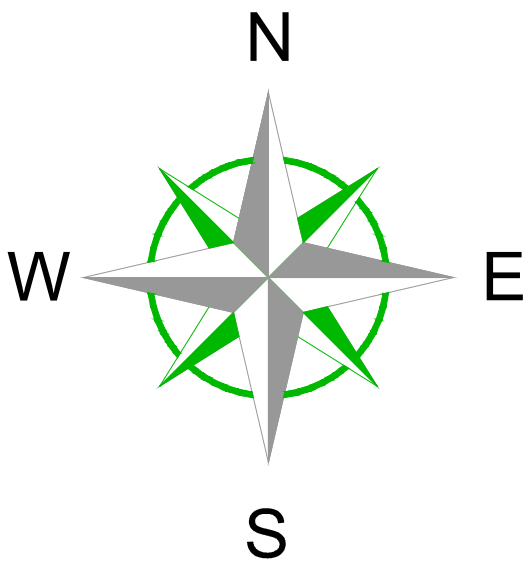
HOLCOMBE MILL,
BRIDGE STREET,
RAMSBOTTOM

DRAWING TITLE

PLANNING LAYOUT

JOB NUMBER	-	REV
DRAWING NUMBER	102	C
DRAWN	JSM	04.11.19
CHECKED	-	1:500
SCALE		A1

APPENDIX B:	Topographic Survey
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Legend

Walls	BS	Bus Stop
Kerb line	BT	British Telecom
Drip Line / Canopy	PH	Fire Hydrant
Top of Bank	WSV	Stop valve
Bottom of Bank	WST	Stop Tap
Fence	WO	Wash Out
Footpath	AV	Air Valve
Hedge	MOR	Service Marker
Control	RE	Rocking eye
Tree	CTV	Cable TV
Vegetation	GP	Gate Post
Gate	LP	Lamp Post
△STN	SP	Sign Post
	EP	Electricity Post
	TP	Telegraph Post
	TL	Traffic light
	RNP	Road Name Plate
	BOL	Bollard
	STAY	Cable Stay
	EIC	Electric Inspection Cover
	GAS	Gas Inspection Cover
	TOB	Top of Bank
	BOB	Bottom of Bank
	ER	Earth rod
	DK	Drop Kerb
	OHE	Overhead Electric Cable
	CHBT	Overhead BT Cable
	FTP	Footpath
	FWB	Flower Bed
	TBIT	Trail Pt
	P	Pole

DRAINAGE ATTRIBUTES	IC	Inspection chamber
	CL	Cover level
	IL	Invert level
	P (in G0.25	Pipe invert (diagonal)
	GV	Gully
	KO	Kerb Outlet
	MH	Manhole

BUILDING DATUM:	RL	Ridge Line
	FFL	Finished Floor Level
	SOF	Soft Level

FENCE TYPES:	CBF	Close Board
	PRF	Post and Rail
	PWF	Post and Wire
	BWF	Barbed Wire
	PLF	Post and lath
	IR	Iron Railings
	CLF	Chain Link
	PFF	Post and Panel

Rev	Date	Description	Drawn
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PROJECT
ECCLESTONE HOMES
RAMSBOTTOM
BL0 9AG

TITLE
TOPOGRAPHICAL
SURVEY

SCALE	DATE	DRAWN	CHECKED BY
1: 500	22.11.2019	GY	

Level datum OSBG 36(15)

Job number RAMS-TOPO-001

Drawing No. RAMS-TOPO-001

Notes:
This plan has been surveyed to the scale shown.
Caution should be exercised when enlargements are made.
All critical dimensions should be confirmed on site prior to the commencement of any works.
All dimensions have been measured or estimated from ground level.
Tree species shown should be treated with caution and expert identification is advised.
Pipe sizes are estimated from a surface inspection only.
Due to Health and Safety requirements.
Every effort is made to identify all visible above ground features, however it should be borne in mind that there may be items obscured at the time of the survey.
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APPENDIX C:	Greenfield Runoff Calculations
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Weetwood		Page 1
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 16/04/2020 16:26 File	Designed by James Aldridge Checked by	
XP Solutions Source Control 2020.1		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.500
Area (ha)	0.580	Urban	0.000
SAAR (mm)	1276	Region Number	Region 10

Results l/s

QBAR Rural	6.5
QBAR Urban	6.5
Q2 years	6.0
Q1 year	5.6
Q30 years	11.0
Q100 years	13.4

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APPENDIX D:

Modified Rational Method

The following parameters have been obtained from the maps in Volume 3 of the Wallingford Procedure:

M5-60 minute rainfall depth:	20 mm
Ratio of M5-60 to M5-2 day rainfall:	0.3
Average Annual Rainfall:	1276 mm
Winter Rain Acceptance Potential/ Soil Type :	5
The Urban Catchment Wetness Index (UCWI) value:	133.8

A time of concentration of 15 minutes has been used.

A rainfall estimation calculation has been carried out to convert the M5-60 minute rainfall to the 15-minute duration rainfall for the 1:1, 1:30 and 1:100 annual probability rainfall events. The calculated rainfall intensities for these events are 28.9, 70.7 and 90.9 mm/hr respectively.

The flow rate as given by the Modified Rational Method is:

$$Q = 2.78 \times C_v \times C_r \times \text{rainfall intensity} \times \text{impermeable area}$$

where:

C_v is the volumetric runoff coefficient = $P_r / \text{PIMP} = 0.86$

where P_r is Percentage Runoff and PIMP is Percentage Impermeable Area

C_r is the routing coefficient = 1.3

Impermeable Area = 2.274 ha

The peak discharges of surface runoff from impermeable areas of the existing site are shown in the table below:

Annual probability of rainfall event	Peak runoff rate (l/s)
1:1	203.5
1:30	497.8
1:100	640.3

APPENDIX E:	Preliminary Surface Water Drainage Layout
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NOTES

1. This drawing to be read in conjunction with all relevant Weetwood drawings.

LEGEND

- Site boundary
Proposed surface water pipe
Proposed surface water manhole



P1	06/08/20	INITIAL ISSUE	JA	KT
Rev	Date	Description	Drawn	Check
Weetwood Development • Planning • Environment			70 Cowcross Street London EC1M 6EJ Tel 0203 757 5444 info@weetwood.net www.weetwood.net	
Client				
ECCLESTON HOMES				
Drawing Status			Date	AUG 2020
PLANNING			Scale (A1)	1:250
Project			Drawn	JA
HOLCOMBE MILL			Checked	KT
RAMSBOTTOM			Project No	4714
Title			Drawing No	C100
SURFACE WATER			Revision	P1
DRAINAGE LAYOUT				

APPENDIX F:	Surface Water Attenuation - Storage Volume Calculation
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Weetwood		Page 1
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 05/08/2020 14:23 File 4714 SW v1.mdx	Designed by James Aldridge Checked by	
XP Solutions Network 2020.1		

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	127.650	1.425	Open Manhole	1200	S1.000	126.225	225				
S2	127.600	1.490	Open Manhole	1200	S1.001	126.110	225	S1.000	126.110	225	
S3	127.500	1.610	Open Manhole	1200	S1.002	125.890	225	S1.001	125.890	225	
S4	126.100	1.425	Open Manhole	1200	S2.000	124.675	225				
S5	126.400	1.880	Open Manhole	1200	S2.001	124.520	225	S2.000	124.520	225	
S6	126.600	2.280	Open Manhole	1500	S2.002	124.320	300	S2.001	124.395	225	
S7	127.400	4.000	Open Manhole	2100	S1.003	123.400	1050	S1.002	125.670	225	1445
								S2.002	124.150	300	
S8	127.050	3.740	Open Manhole	2100	S1.004	123.310	1050	S1.003	123.310	1050	
S9	126.700	3.490	Open Manhole	2100	S1.005	123.210	1050	S1.004	123.210	1050	
S10	125.500	2.355	Open Manhole	2100	S1.006	123.145	450	S1.005	123.145	1050	
S	125.250	2.150	Open Manhole	0		OUTFALL		S1.006	123.100	450	
S11	126.150	1.775	Open Manhole	1500	S3.000	124.375	600				
S12	126.150	1.870	Open Manhole	1800	S3.001	124.280	600	S3.000	124.280	600	
S13	126.150	1.870	Open Manhole	1500	S4.000	124.280	600				
S14	126.150	1.915	Open Manhole	1800	S4.001	124.235	600	S4.000	124.235	600	
S15	126.150	1.955	Open Manhole	1800	S3.002	124.195	600	S3.001	124.195	600	
								S4.001	124.195	600	
S16	126.150	1.980	Open Manhole	1800	S3.003	124.170	600	S3.002	124.170	600	
S17	126.650	2.345	Open Manhole	1500	S5.000	124.305	600				
S18	126.650	2.385	Open Manhole	1800	S5.001	124.265	600	S5.000	124.265	600	
S19	126.650	2.435	Open Manhole	1800	S5.002	124.215	600	S5.001	124.215	600	
S20	126.650	2.520	Open Manhole	1800	S3.004	124.130	600	S3.003	124.130	600	
								S5.002	124.130	600	
S21	126.650	2.550	Open Manhole	1800	S3.005	124.100	600	S3.004	124.100	600	
S22	126.250	2.175	Open Manhole	2100	S3.006	124.075	450	S3.005	124.075	600	
S	126.150	2.100	Open Manhole	0		OUTFALL		S3.006	124.050	450	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	379312.017	416808.264	379312.017	416808.264	Required	
S2	379308.825	416791.352	379308.825	416791.352	Required	



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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	127.650	126.225	1.200	Open Manhole	1200
S1.001	o	225	S2	127.600	126.110	1.265	Open Manhole	1200
S1.002	o	225	S3	127.500	125.890	1.385	Open Manhole	1200
S2.000	o	225	S4	126.100	124.675	1.200	Open Manhole	1200
S2.001	o	225	S5	126.400	124.520	1.655	Open Manhole	1200
S2.002	o	300	S6	126.600	124.320	1.980	Open Manhole	1500
S1.003	o	1050	S7	127.400	123.400	2.950	Open Manhole	2100
S1.004	o	1050	S8	127.050	123.310	2.690	Open Manhole	2100
S1.005	o	1050	S9	126.700	123.210	2.440	Open Manhole	2100
S1.006	o	450	S10	125.500	123.145	1.905	Open Manhole	2100
S3.000	o	600	S11	126.150	124.375	1.175	Open Manhole	1500
S3.001	o	600	S12	126.150	124.280	1.270	Open Manhole	1800
S4.000	o	600	S13	126.150	124.280	1.270	Open Manhole	1500
S4.001	o	600	S14	126.150	124.235	1.315	Open Manhole	1800
S3.002	o	600	S15	126.150	124.195	1.355	Open Manhole	1800
S3.003	o	600	S16	126.150	124.170	1.380	Open Manhole	1800

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)
S1.000	17.211	149.7	S2	127.600	126.110	1.265	Open Manhole	1200
S1.001	32.617	148.3	S3	127.500	125.890	1.385	Open Manhole	1200
S1.002	32.985	149.9	S7	127.400	125.670	1.505	Open Manhole	2100
S2.000	22.664	146.2	S5	126.400	124.520	1.655	Open Manhole	1200
S2.001	18.299	146.4	S6	126.600	124.395	1.980	Open Manhole	1500
S2.002	32.026	188.4	S7	127.400	124.150	2.950	Open Manhole	2100
S1.003	44.369	493.0	S8	127.050	123.310	2.690	Open Manhole	2100
S1.004	49.395	494.0	S9	126.700	123.210	2.440	Open Manhole	2100
S1.005	30.791	473.7	S10	125.500	123.145	1.305	Open Manhole	2100
S1.006	11.126	247.2	S	125.250	123.100	1.700	Open Manhole	0
S3.000	45.845	482.6	S12	126.150	124.280	1.270	Open Manhole	1800
S3.001	40.592	477.6	S15	126.150	124.195	1.355	Open Manhole	1800
S4.000	21.309	473.5	S14	126.150	124.235	1.315	Open Manhole	1800
S4.001	18.759	469.0	S15	126.150	124.195	1.355	Open Manhole	1800
S3.002	12.284	491.4	S16	126.150	124.170	1.380	Open Manhole	1800
S3.003	19.687	492.2	S20	126.650	124.130	1.920	Open Manhole	1800

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S5.000	o	600	S17	126.650	124.305	1.745	Open Manhole	1500
S5.001	o	600	S18	126.650	124.265	1.785	Open Manhole	1800
S5.002	o	600	S19	126.650	124.215	1.835	Open Manhole	1800
S3.004	o	600	S20	126.650	124.130	1.920	Open Manhole	1800
S3.005	o	600	S21	126.650	124.100	1.950	Open Manhole	1800
S3.006	o	450	S22	126.250	124.075	1.725	Open Manhole	2100

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)
S5.000	18.797	469.9	S18	126.650	124.265	1.785	Open Manhole	1800
S5.001	24.469	489.4	S19	126.650	124.215	1.835	Open Manhole	1800
S5.002	41.678	490.3	S20	126.650	124.130	1.920	Open Manhole	1800
S3.004	13.642	454.7	S21	126.650	124.100	1.950	Open Manhole	1800
S3.005	11.720	468.8	S22	126.250	124.075	1.575	Open Manhole	2100
S3.006	6.143	245.7	S	126.150	124.050	1.650	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.081	0.081	0.081
1.001	User	-	100	0.053	0.053	0.053
1.002	User	-	100	0.062	0.062	0.062
2.000	User	-	100	0.043	0.043	0.043
2.001	User	-	100	0.026	0.026	0.026
2.002	User	-	100	0.060	0.060	0.060
1.003	User	-	100	0.084	0.084	0.084
1.004	User	-	100	0.051	0.051	0.051
	User	-	100	0.056	0.056	0.107
1.005	User	-	100	0.071	0.071	0.071
	User	-	100	0.016	0.016	0.087
	User	-	100	0.016	0.016	0.103
1.006	User	-	100	0.014	0.014	0.014
3.000	User	-	100	0.026	0.026	0.026
	User	-	100	0.059	0.059	0.085
3.001	User	-	100	0.013	0.013	0.013
	User	-	100	0.111	0.111	0.124
	User	-	100	0.010	0.010	0.134
	User	-	100	0.010	0.010	0.145
4.000	User	-	100	0.063	0.063	0.063
	User	-	100	0.010	0.010	0.073
	User	-	100	0.013	0.013	0.086
4.001	User	-	100	0.010	0.010	0.010
	User	-	100	0.015	0.015	0.025
3.002	User	-	100	0.042	0.042	0.042
3.003	User	-	100	0.029	0.029	0.029
	User	-	100	0.007	0.007	0.035
5.000	User	-	100	0.039	0.039	0.039
	User	-	100	0.052	0.052	0.091
	User	-	100	0.016	0.016	0.107
5.001	User	-	100	0.035	0.035	0.035
	User	-	100	0.010	0.010	0.045
5.002	User	-	100	0.036	0.036	0.036
3.004	User	-	100	0.007	0.007	0.007
	User	-	100	0.018	0.018	0.024
	User	-	100	0.010	0.010	0.035
3.005	User	-	100	0.018	0.018	0.018
	User	-	100	0.010	0.010	0.029
3.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.302	1.302	1.302

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	125.250	123.100	0.000	0	0

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S10, DS/PN: S1.006, Volume (m³): 33.0

Unit Reference	MD-SHE-0302-6000-2255-6000
Design Head (m)	2.255
Design Flow (l/s)	60.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	302
Invert Level (m)	123.145
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.255	60.0
Flush-Flo™	0.679	59.9
Kick-Flo®	1.480	49.0
Mean Flow over Head Range	-	51.7

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	9.2	1.200	56.4	3.000	68.9	7.000	104.0
0.200	31.0	1.400	52.0	3.500	74.2	7.500	107.5
0.300	52.8	1.600	50.8	4.000	79.2	8.000	110.9
0.400	57.2	1.800	53.8	4.500	83.8	8.500	114.3
0.500	59.0	2.000	56.6	5.000	88.2	9.000	117.5
0.600	59.8	2.200	59.3	5.500	92.4	9.500	120.7
0.800	59.7	2.400	61.8	6.000	96.4		
1.000	58.5	2.600	64.3	6.500	100.3		

Hydro-Brake® Optimum Manhole: S22, DS/PN: S3.006, Volume (m³): 10.3

Unit Reference	MD-SHE-0351-8200-1975-8200
Design Head (m)	1.975
Design Flow (l/s)	82.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	351
Invert Level (m)	124.075
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

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<table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>1.975</td><td>82.0</td></tr><tr><td>Flush-Flo™</td><td>0.641</td><td>81.9</td></tr><tr><td>Kick-Flo®</td><td>1.378</td><td>68.9</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>69.6</td></tr></table>						Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.975	82.0	Flush-Flo™	0.641	81.9	Kick-Flo®	1.378	68.9	Mean Flow over Head Range	-	69.6																																																																																																																											
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<table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>S1.000</td><td>S1</td><td>1.612</td><td>0.684</td><td>0.000</td><td>2.296</td></tr><tr><td>S1.001</td><td>S2</td><td>1.685</td><td>1.297</td><td>0.000</td><td>2.982</td></tr><tr><td>S1.002</td><td>S3</td><td>1.821</td><td>1.312</td><td>0.000</td><td>3.132</td></tr><tr><td>S2.000</td><td>S4</td><td>1.612</td><td>0.901</td><td>0.000</td><td>2.513</td></tr><tr><td>S2.001</td><td>S5</td><td>2.126</td><td>0.728</td><td>0.000</td><td>2.854</td></tr><tr><td>S2.002</td><td>S6</td><td>4.029</td><td>2.264</td><td>0.000</td><td>6.293</td></tr><tr><td>S1.003</td><td>S7</td><td>13.854</td><td>38.419</td><td>0.000</td><td>52.274</td></tr><tr><td>S1.004</td><td>S8</td><td>12.954</td><td>42.771</td><td>0.000</td><td>55.725</td></tr><tr><td>S1.005</td><td>S9</td><td>12.088</td><td>26.662</td><td>0.000</td><td>38.750</td></tr><tr><td>S1.006</td><td>S10</td><td>8.157</td><td>1.770</td><td>0.000</td><td>9.926</td></tr><tr><td>S3.000</td><td>S11</td><td>3.137</td><td>12.962</td><td>0.000</td><td>16.099</td></tr><tr><td>S3.001</td><td>S12</td><td>4.759</td><td>11.477</td><td>0.000</td><td>16.236</td></tr><tr><td>S4.000</td><td>S13</td><td>3.305</td><td>6.025</td><td>0.000</td><td>9.330</td></tr><tr><td>S4.001</td><td>S14</td><td>4.873</td><td>5.304</td><td>0.000</td><td>10.177</td></tr><tr><td>S3.002</td><td>S15</td><td>4.975</td><td>3.473</td><td>0.000</td><td>8.448</td></tr><tr><td>S3.003</td><td>S16</td><td>5.038</td><td>5.566</td><td>0.000</td><td>10.605</td></tr><tr><td>S5.000</td><td>S17</td><td>4.144</td><td>5.315</td><td>0.000</td><td>9.459</td></tr><tr><td>S5.001</td><td>S18</td><td>6.069</td><td>6.918</td><td>0.000</td><td>12.988</td></tr><tr><td>S5.002</td><td>S19</td><td>6.196</td><td>11.784</td><td>0.000</td><td>17.980</td></tr><tr><td>S3.004</td><td>S20</td><td>6.413</td><td>3.857</td><td>0.000</td><td>10.270</td></tr><tr><td>S3.005</td><td>S21</td><td>6.489</td><td>3.314</td><td>0.000</td><td>9.803</td></tr><tr><td>S3.006</td><td>S22</td><td>7.533</td><td>0.977</td><td>0.000</td><td>8.510</td></tr></table>						Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	S1.000	S1	1.612	0.684	0.000	2.296	S1.001	S2	1.685	1.297	0.000	2.982	S1.002	S3	1.821	1.312	0.000	3.132	S2.000	S4	1.612	0.901	0.000	2.513	S2.001	S5	2.126	0.728	0.000	2.854	S2.002	S6	4.029	2.264	0.000	6.293	S1.003	S7	13.854	38.419	0.000	52.274	S1.004	S8	12.954	42.771	0.000	55.725	S1.005	S9	12.088	26.662	0.000	38.750	S1.006	S10	8.157	1.770	0.000	9.926	S3.000	S11	3.137	12.962	0.000	16.099	S3.001	S12	4.759	11.477	0.000	16.236	S4.000	S13	3.305	6.025	0.000	9.330	S4.001	S14	4.873	5.304	0.000	10.177	S3.002	S15	4.975	3.473	0.000	8.448	S3.003	S16	5.038	5.566	0.000	10.605	S5.000	S17	4.144	5.315	0.000	9.459	S5.001	S18	6.069	6.918	0.000	12.988	S5.002	S19	6.196	11.784	0.000	17.980	S3.004	S20	6.413	3.857	0.000	10.270	S3.005	S21	6.489	3.314	0.000	9.803	S3.006	S22	7.533	0.977	0.000	8.510
Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)																																																																																																																																										
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Volume Summary (Static)

Pipe	USMH	Manhole	Pipe	Storage	Total
Number	Name	Volume (m ³)	Volume (m ³)	Structure Volume (m ³)	Volume (m ³)
Total		122.868	193.780	0.000	316.649

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Micro Drainage

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

Simulation Criteria

Areal Reduction Factor 1.000
Hot Start (mins) 0
Hot Start Level (mm) 0
Manhole Headloss Coeff (Global) 0.500
Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000
MADD Factor * 10m³/ha Storage 2.000
Inlet Coefficient 0.800
Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0
Number of Online Controls 2
Number of Offline Controls 0

Number of Storage Structures 0
Number of Time/Area Diagrams 0
Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000

Ratio R 0.300
Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1 15 minute	1 year Winter I+0%	127.650	126.305	-0.145	0.000	0.27
S1.001	S2 15 minute	1 year Winter I+0%	127.600	126.209	-0.126	0.000	0.39
S1.002	S3 15 minute	1 year Winter I+0%	127.500	126.010	-0.105	0.000	0.55
S2.000	S4 15 minute	1 year Winter I+0%	126.100	124.731	-0.169	0.000	0.13
S2.001	S5 15 minute	1 year Winter I+0%	126.400	124.590	-0.155	0.000	0.21
S2.002	S6 15 minute	1 year Winter I+0%	126.600	124.410	-0.210	0.000	0.20
S1.003	S7 15 minute	1 year Winter I+0%	127.400	123.568	-0.882	0.000	0.04
S1.004	S8 15 minute	1 year Winter I+0%	127.050	123.502	-0.858	0.000	0.05
S1.005	S9 15 minute	1 year Winter I+0%	126.700	123.451	-0.809	0.000	0.05
S1.006	S10 15 minute	1 year Winter I+0%	125.500	123.433	-0.162	0.000	0.34
S3.000	S11 15 minute	1 year Winter I+0%	126.150	124.474	-0.501	0.000	0.04
S3.001	S12 15 minute	1 year Winter I+0%	126.150	124.434	-0.446	0.000	0.08
S4.000	S13 30 minute	1 year Winter I+0%	126.150	124.414	-0.466	0.000	0.04
S4.001	S14 30 minute	1 year Winter I+0%	126.150	124.410	-0.425	0.000	0.04
S3.002	S15 30 minute	1 year Winter I+0%	126.150	124.408	-0.387	0.000	0.18
S3.003	S16 30 minute	1 year Winter I+0%	126.150	124.392	-0.378	0.000	0.15
S5.000	S17 15 minute	1 year Winter I+0%	126.650	124.425	-0.480	0.000	0.06
S5.001	S18 30 minute	1 year Winter I+0%	126.650	124.398	-0.467	0.000	0.06
S5.002	S19 30 minute	1 year Winter I+0%	126.650	124.386	-0.429	0.000	0.06

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

PN	US/MH Overflow		Pipe Flow	Status
	Name	(l/s)	(l/s)	
S1.000	S1		10.1	OK
S1.001	S2		15.7	OK
S1.002	S3		22.0	OK
S2.000	S4		5.3	OK
S2.001	S5		8.1	OK
S2.002	S6		14.5	OK
S1.003	S7		44.2	OK
S1.004	S8		50.6	OK
S1.005	S9		51.4	OK
S1.006	S10		50.0	OK
S3.000	S11		10.3	OK
S3.001	S12		21.8	OK
S4.000	S13		8.4	OK
S4.001	S14		8.9	OK
S3.002	S15		28.9	OK
S3.003	S16		30.8	OK
S5.000	S17		13.1	OK
S5.001	S18		14.2	OK
S5.002	S19		15.5	OK

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

						Water	Surcharged	Flooded	
	US/MH			US/CL	Level	Depth	Volume	Flow /	
PN	Name	Event		(m)	(m)	(m)	(m³)	Cap.	
S3.004	S20	30 minute	1 year Winter I+0%	126.650	124.377	-0.353	0.000	0.25	
S3.005	S21	30 minute	1 year Winter I+0%	126.650	124.354	-0.346	0.000	0.28	
S3.006	S22	30 minute	1 year Winter I+0%	126.250	124.333	-0.192	0.000	0.37	

			Pipe	
	US/MH	Overflow	Flow	
PN	Name	(l/s)	(l/s)	Status
S3.004	S20		45.2	OK
S3.005	S21		46.7	OK
S3.006	S22		46.6	OK

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

			Pipe	
	US/MH	Overflow	Flow	
PN	Name	(l/s)	(l/s)	Status
S1.000	S1		22.3	SURCHARGED
S1.001	S2		35.7	SURCHARGED
S1.002	S3		51.5	SURCHARGED
S2.000	S4		13.0	OK
S2.001	S5		21.1	OK
S2.002	S6		40.1	OK
S1.003	S7		95.7	OK
S1.004	S8		95.3	OK
S1.005	S9		81.5	OK
S1.006	S10		59.7	SURCHARGED
S3.000	S11		20.4	OK
S3.001	S12		46.2	OK
S4.000	S13		20.3	OK
S4.001	S14		20.0	OK
S3.002	S15		60.1	OK
S3.003	S16		63.0	OK
S5.000	S17		25.4	OK
S5.001	S18		30.3	OK
S5.002	S19		29.8	OK

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

						Water	Surcharged	Flooded	
PN	US/MH Name	Event	US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.		
S3.004	S20	30 minute	30 year Winter I+0%	126.650	124.581	-0.149	0.000	0.46	
S3.005	S21	30 minute	30 year Winter I+0%	126.650	124.564	-0.136	0.000	0.50	
S3.006	S22	30 minute	30 year Winter I+0%	126.250	124.550	0.025	0.000	0.64	

			Pipe	
PN	US/MH Name	Overflow (l/s)	Flow (l/s)	Status
S3.004	S20		81.9	OK
S3.005	S21		83.1	OK
S3.006	S22		79.9	SURCHARGED

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Micro Drainage

Joseph's Well
Hanover Walk
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 0

Number of Online Controls 2

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.300

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1 15 minute	100 year Winter I+40%	127.650	127.548	1.098	0.000	1.02
S1.001	S2 15 minute	100 year Winter I+40%	127.600	127.434	1.099	0.000	1.49
S1.002	S3 15 minute	100 year Winter I+40%	127.500	126.933	0.818	0.000	2.16
S2.000	S4 60 minute	100 year Winter I+40%	126.100	125.460	0.560	0.000	0.35
S2.001	S5 60 minute	100 year Winter I+40%	126.400	125.452	0.707	0.000	0.58
S2.002	S6 60 minute	100 year Winter I+40%	126.600	125.440	0.820	0.000	0.57
S1.003	S7 60 minute	100 year Winter I+40%	127.400	125.426	0.976	0.000	0.12
S1.004	S8 60 minute	100 year Winter I+40%	127.050	125.423	1.063	0.000	0.10
S1.005	S9 60 minute	100 year Winter I+40%	126.700	125.420	1.160	0.000	0.09
S1.006	S10 60 minute	100 year Winter I+40%	125.500	125.417	1.822	0.000	0.41
S3.000	S11 30 minute	100 year Winter I+40%	126.150	126.123	1.148	0.000	0.12
S3.001	S12 30 minute	100 year Winter I+40%	126.150	126.120	1.240	0.000	0.24
S4.000	S13 30 minute	100 year Winter I+40%	126.150	126.118	1.238	0.000	0.15
S4.001	S14 30 minute	100 year Winter I+40%	126.150	126.116	1.281	0.000	0.14
S3.002	S15 30 minute	100 year Winter I+40%	126.150	126.113	1.318	0.000	0.52
S3.003	S16 30 minute	100 year Winter I+40%	126.150	126.106	1.336	0.000	0.41
S5.000	S17 30 minute	100 year Winter I+40%	126.650	126.108	1.203	0.000	0.21
S5.001	S18 30 minute	100 year Winter I+40%	126.650	126.105	1.240	0.000	0.21
S5.002	S19 30 minute	100 year Winter I+40%	126.650	126.102	1.287	0.000	0.18

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

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1		38.5	FLOOD RISK
S1.001	S2		59.6	FLOOD RISK
S1.002	S3		85.9	SURCHARGED
S2.000	S4		13.8	SURCHARGED
S2.001	S5		22.3	SURCHARGED
S2.002	S6		41.8	SURCHARGED
S1.003	S7		122.4	SURCHARGED
S1.004	S8		104.6	SURCHARGED
S1.005	S9		86.1	SURCHARGED
S1.006	S10		60.2	FLOOD RISK
S3.000	S11		33.0	FLOOD RISK
S3.001	S12		65.0	FLOOD RISK
S4.000	S13		34.5	FLOOD RISK
S4.001	S14		29.1	FLOOD RISK
S3.002	S15		84.6	FLOOD RISK
S3.003	S16		85.2	FLOOD RISK
S5.000	S17		43.4	SURCHARGED
S5.001	S18		50.0	SURCHARGED
S5.002	S19		47.8	SURCHARGED

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

	US/MH				Water	Surcharged	Flooded	
PN	Name	Event	US/CL	Level	Depth	Volume	Flow /	
			(m)	(m)	(m)	(m³)	Cap.	
S3.004	S20	30 minute 100 year Winter I+40%	126.650	126.096	1.366	0.000	0.64	
S3.005	S21	30 minute 100 year Winter I+40%	126.650	126.083	1.383	0.000	0.63	
S3.006	S22	30 minute 100 year Winter I+40%	126.250	126.070	1.545	0.000	0.66	

			Pipe	
	US/MH	Overflow	Flow	
PN	Name	(l/s)	(l/s)	Status
S3.004	S20		114.0	SURCHARGED
S3.005	S21		105.3	SURCHARGED
S3.006	S22		82.3	FLOOD RISK

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