SIDEBOTTOM
RICHARDSON
CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

15 High Street,
Spalding,
Lincs. PE11 1TW

Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

SURFACE WATER DRAINAGE STRATEGY

PROPOSED RESIDENTIAL DEVELOPMENT AT 163-183 HIGH ROAD, WESTON, SPALDING, LINCS. PE12 6JU

For Mr R. & Mrs Y. Biehler

July 2018

Introduction

1) New Planning Requirements make it necessary to consider Sustainable Drainage Systems (SuDS) with respect to planning applications of the size and number of dwellings in this instance.

2) It is recognised that the type and scale of this development is what the local planning department is supporting. This being relatively dense use of available land.

3) The site is located to the north of High Road, and has typical low-lying flat Fenland topography. The proposed development site area is 2.88 hectares.

Discussion

With respect to SuDS, the introduction of a swale/filter drain along the road/pavement was considered. Due to the limited amount of available land and the relatively short lengths of road, these were considered to be impractical and unreasonable and therefore discounted. Furthermore, the high ground water table and flat topography experienced in the Fenland areas make these features unfeasible. These challenges are highlighted in 'Lincolnshire Development Roads and Sustainable Drainage Design Approach, November 2017 Edition'.

Further thought/discussion was given to providing a permeable road surface throughout and an open stone road base with an impermeable membrane to direct water to the drainage system.

This was considered unworkable since there would be many penetrations in the membrane for the foul sewer and all services.

Furthermore, Lincolnshire County Council would not adopt a permeable road surface in this area due to the high ground water table.

To discharge to an Internal Drainage Board open, there is a requirement to minimise rainfall discharge into their system. Consequently, the available space for soakaways to accept roof water also needs to be considered.

Ground investigations are to be carried out prior to submitting a full planning application to ascertain the use of. Due to raising the existing ground levels it is anticipated that the results will prove that soakaways are suitable for private drainage.

With respect to the local plan, it is necessary to provide affordable housing. Consequently, on small sites, it is necessary to have a relatively dense development, giving limited available space for swales, lagoons etc.

Having considered the "Development Road and Sustainable Drainage Specification and Construction". May 2018 Edition, issued by Lincolnshire County Council Highway and Flood Authority, it is clear that the introduction of swales or filter drains, would not comply with the design requirements of the document.

Reference being made to Figure 5/8 Element 12 and Figure 5/11 element 9, where in the Fenland Area the maximum ground water level cannot be achieved.

Design Proposal

The site has an existing unmaintained watercourse to the northern boundary, which falls to the north east corner of the site. From this point the drain heads north to a South Holland Internal Drainage Board (SHIDB) maintained watercourse.

It is proposed to improve these two sections of watercourse as highlighted on the plan below, to SHIDB specifications for them to take responsibility of these sections. The landowner to which the two watercourses are adjacent to has no objection to these improvement works being undertaken, see letter from Mr Albert Slator below.

The proposed surface water drainage scheme is to discharge water from the road only into this newly maintained SHIDB system to the north of the site via a single outfall.

The outfall will have a restricted discharge to 5.0 litres per second via the use of a HydroBrake located in an upstream chamber. The excess flows over this discharge rate will be stored in the new upstream pipe network, and open attenuation basin within the public open space.

Surface water from the roofs will be placed in suitable designed soakaways.

Please refer to attached drawing No.d 37617/10 for drainage design and layout. This drawing has been prepared in conjunction with MicroDrainage design calculations, also attached.

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ALL DRAINAGE FOR PRIVATE ACCESS ROADS, ROOF WATER & DRIVEWAYS TO DISCHARGE TO PRIVATE SOAKAWAYS LOCATED IN REAR GARDENS

Existing Dyke To Be Improved To South
Holland Internal Drainage Board Specification
& Offered For Their Maintenance

Purple Area = 0.400ha
Flow Restricted & Attenuated To 5.0 l/s

Approx. Dyke IL 1.450
New Outfall IL 1.642

Chamber To Be Fitted With HydroBrake
To Restrict Flows To 5.0 l/s

Attenuation Basin Volume =
150m³ @ 0.5m Depth

Fence at top of bank – unable to access further

Wire compound fence at top of bank

Deer Park – Unable to Access

Line between concrete posts

Group of conifers

Edge of grass

Panel fence

Tarmac Footpath

PRIVATE DRIVE

PUBLIC OPEN SPACE

EXISTING BUNGALOWS

EXISTING BUNGALOW

HIGH ROAD

Key:

- Proposed Highway Drain
- Proposed Highway Manhole
- Proposed Highway Gully
- 3.67 Existing Site Level

N

Rev	Date	Remarks

Status: FOR INFORMATION

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15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: Proposed Residential Development at 163 - 183, High Road, Weston, Spalding, Lincs PE12 6JU

Title: Proposed Drainage Strategy

Date	Jun. '18	Scale	1:500 @A1
Drawn	MP	Checked	SRC
Design	SRC	File Name	37617-10

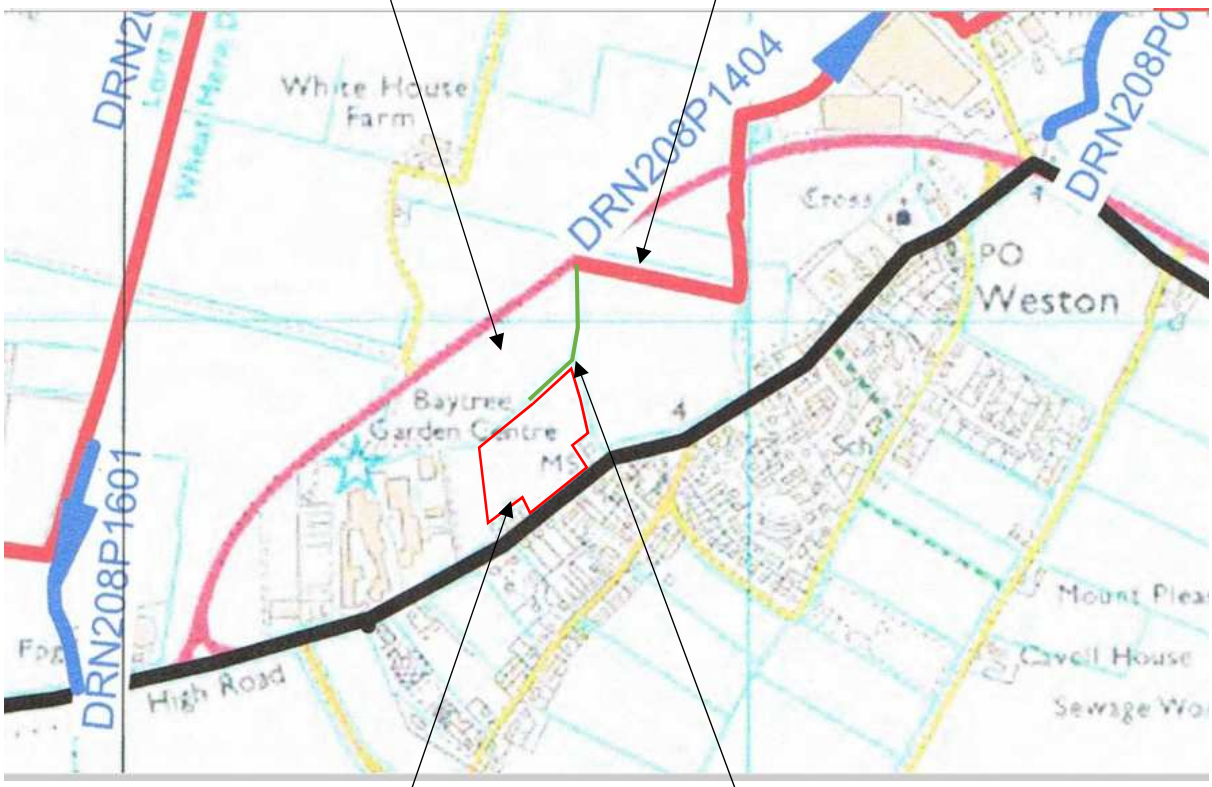
DRG No. 37617/10 Rev -

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Proposed Watercourse Improvements Plan

See Letter Of Consent From This Field Landowner To Allow Access For Improvements To Dyke

Existing High Priority SHIDB Maintained Watercourse



Red Line - Proposed Site Boundary

Green Line Represents Length Of Existing Watercourse To Be Improved To SHIDB Specification

BARRINGTON HOUSE

32 BARRINGTON GATE

HOLBEACH

LINCS.

PE12 7LB

MR R F F BIEHLER

BAYTREE NURSERIES

HIGH ROAD

WESTON

SPALDING

LINCS .

PE12 6JU

02.04.18

WITHOUT PREDJUDICE.

Dear Reinhard,

Re: Proposed Outline Planning Application for housing in Weston.

I am happy to allow access to my field (TF2824 5890), located to the north of your land, to allow improvements to the drainage dyke and to allow passage of surface water from any proposed housing development through the dyke, subject to our agreement regarding final drainage scheme layout.

Yours Sincerely,

AERSlato.

Albert Slator

GOV.UK – Rural Payments

Parcel details

SLATOR BROTHERS (FARMS) LTD

Parcel ID: TF2824 5890

This is a summary of the land parcel information Rural Payments currently holds for this land.

Summary	
BPS eligible area (ha)	3.63
Total area (ha)	3.63



Time Area Diagram for Existing

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.130	4-8	0.259	8-12	0.011

Total Area Contributing (ha) = 0.400

Total Pipe Volume (m^3) = 19.655

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Existing Network Details for Existing

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
E1.000	48.419	0.277	174.8	0.064	5.00	0.0	0.600	o	225	Pipe/Conduit
E1.001	21.996	0.126	174.6	0.029	0.00	0.0	0.600	o	225	Pipe/Conduit
E2.000	30.000	0.171	175.4	0.055	5.00	0.0	0.600	o	225	Pipe/Conduit
E2.001	18.229	0.104	175.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
E1.002	27.843	0.159	175.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
E3.000	18.000	0.072	250.0	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
E1.003	31.291	0.125	250.3	0.051	0.00	0.0	0.600	o	300	Pipe/Conduit
E4.000	12.000	0.080	150.0	0.014	5.00	0.0	0.600	o	150	Pipe/Conduit
E5.000	7.952	0.053	150.0	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit
E4.001	38.500	0.220	175.0	0.037	0.00	0.0	0.600	o	225	Pipe/Conduit
E6.000	6.383	0.043	148.4	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit
E4.002	38.562	0.220	175.3	0.065	0.00	0.0	0.600	o	225	Pipe/Conduit
E4.003	28.633	0.164	174.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
E1.000	2.725	0.064	0.0	0.99	39.2
E1.001	2.448	0.093	0.0	0.99	39.2
E2.000	2.597	0.055	0.0	0.98	39.1
E2.001	2.426	0.055	0.0	0.98	39.1
E1.002	2.322	0.148	0.0	0.98	39.2
E3.000	2.160	0.000	0.0	0.99	70.0
E1.003	2.088	0.198	0.0	0.99	69.9
E4.000	2.797	0.014	0.0	0.82	14.5
E5.000	2.770	0.013	0.0	0.82	14.5
E4.001	2.642	0.064	0.0	0.99	39.2
E6.000	2.540	0.013	0.0	0.82	14.5
E4.002	2.422	0.142	0.0	0.98	39.1
E4.003	2.202	0.142	0.0	0.99	39.2

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Existing Network Details for Existing

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
E1.004	47.500	0.190	250.0	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit
E1.005	32.838	0.131	250.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
E1.004	1.963	0.400	0.0	0.99	70.0
E1.005	1.773	0.400	0.0	0.99	69.9

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PIPELINE SCHEDULES for Existing

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)
E1.000	o	225	E1	3.750	2.725	0.800	Open Manhole	1200
E1.001	o	225	E2	3.700	2.448	1.027	Open Manhole	1200
E2.000	o	225	E7	3.690	2.597	0.868	Open Manhole	1200
E2.001	o	225	E8	3.500	2.426	0.849	Open Manhole	1200
E1.002	o	225	E3	3.850	2.322	1.303	Open Manhole	1200
E3.000	o	300	E9	3.000	2.160	0.540	Open Manhole	1200
E1.003	o	300	E4	3.680	2.088	1.292	Open Manhole	1200
E4.000	o	150	E10	3.800	2.797	0.853	Open Manhole	1200
E5.000	o	150	E14	3.800	2.770	0.880	Open Manhole	1200
E4.001	o	225	E11	3.850	2.642	0.983	Open Manhole	1200
E6.000	o	150	E15	3.800	2.540	1.110	Open Manhole	1200
E4.002	o	225	E12	3.850	2.422	1.203	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)
E1.000	48.419	174.8	E2	3.700	2.448	1.027	Open Manhole	1200
E1.001	21.996	174.6	E3	3.850	2.322	1.303	Open Manhole	1200
E2.000	30.000	175.4	E8	3.500	2.426	0.849	Open Manhole	1200
E2.001	18.229	175.3	E3	3.850	2.322	1.303	Open Manhole	1200
E1.002	27.843	175.1	E4	3.680	2.163	1.292	Open Manhole	1200
E3.000	18.000	250.0	E4	3.680	2.088	1.292	Open Manhole	1200
E1.003	31.291	250.3	E5	3.850	1.963	1.587	Open Manhole	1200
E4.000	12.000	150.0	E11	3.850	2.717	0.983	Open Manhole	1200
E5.000	7.952	150.0	E11	3.850	2.717	0.983	Open Manhole	1200
E4.001	38.500	175.0	E12	3.850	2.422	1.203	Open Manhole	1200
E6.000	6.383	148.4	E12	3.850	2.497	1.203	Open Manhole	1200
E4.002	38.562	175.3	E13	3.620	2.202	1.193	Open Manhole	1200

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PIPELINE SCHEDULES for Existing

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)
E4.003	o	225	E13	3.620	2.202	1.193	Open Manhole	1200
E1.004	o	300	E5	3.850	1.963	1.587	Open Manhole	1200
E1.005	o	300	E6	3.780	1.773	1.707	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)
E4.003	28.633	174.6	E5	3.850	2.038	1.587	Open Manhole	1200
E1.004	47.500	250.0	E6	3.780	1.773	1.707	Open Manhole	1200
E1.005	32.838	250.7	E	3.500	1.642	1.558	Open Manhole	0

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.064	0.064	0.064
1.001	User	-	100	0.029	0.029	0.029
2.000	User	-	100	0.009	0.009	0.009
	User	-	100	0.046	0.046	0.055
2.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.051	0.051	0.051
4.000	User	-	100	0.014	0.014	0.014
5.000	User	-	100	0.013	0.013	0.013
4.001	User	-	100	0.037	0.037	0.037
6.000	User	-	100	0.013	0.013	0.013
4.002	User	-	100	0.065	0.065	0.065
4.003	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.059	0.059	0.059
1.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.400	0.400	0.400

Free Flowing Outfall Details for Existing

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
E1.005	E	3.500	1.642	1.642	0	0

Simulation Criteria for Existing

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Existing

Hydro-Brake® Optimum Manhole: E6, DS/PN: E1.005, Volume (m³): 5.5

Unit Reference	MD-SHE-0095-5000-1700-5000
Design Head (m)	1.700
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	95
Invert Level (m)	1.773
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	5.0
Flush-Flo™	0.417	4.5
Kick-Flo®	0.851	3.6
Mean Flow over Head Range	-	4.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1	1.200	4.3	3.000	6.5	7.000	9.7
0.200	4.2	1.400	4.6	3.500	7.0	7.500	10.1
0.300	4.5	1.600	4.9	4.000	7.5	8.000	10.4
0.400	4.5	1.800	5.1	4.500	7.9	8.500	10.7
0.500	4.5	2.000	5.4	5.000	8.3	9.000	11.0
0.600	4.4	2.200	5.6	5.500	8.7	9.500	11.3
0.800	3.9	2.400	5.9	6.000	9.0		
1.000	3.9	2.600	6.1	6.500	9.4		

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
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, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
E1.000	E1	60 Winter	1	+0%	30/15 Summer	100/15 Summer		
E1.001	E2	120 Winter	1	+0%	1/15 Winter			
E2.000	E7	120 Winter	1	+0%	1/60 Winter			
E2.001	E8	120 Winter	1	+0%	1/15 Winter	30/1440 Winter		
E1.002	E3	120 Winter	1	+0%	1/15 Summer			
E3.000	E9	120 Summer	1	+0%	1/15 Summer	1/120 Winter		
E1.003	E4	120 Summer	1	+0%	1/15 Summer	30/120 Summer		
E4.000	E10	60 Winter	1	+0%	30/15 Summer	100/15 Summer		
E5.000	E14	60 Winter	1	+0%	30/15 Summer	100/15 Summer		
E4.001	E11	120 Winter	1	+0%	1/60 Winter	100/30 Summer		
E6.000	E15	120 Winter	1	+0%	1/30 Summer	100/15 Summer		
E4.002	E12	120 Winter	1	+0%	1/15 Winter			
E4.003	E13	360 Winter	1	+0%	1/15 Summer	30/15 Summer		
E1.004	E5	360 Winter	1	+0%	1/15 Summer	30/120 Summer		
E1.005	E6	360 Winter	1	+0%	1/15 Summer	1/480 Summer		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
E1.000	E1	2.879	-0.071	0.000	0.12		4.4	OK	3
E1.001	E2	2.896	0.223	0.000	0.12		4.1	SURCHARGED	
E2.000	E7	2.889	0.067	0.000	0.06		2.4	SURCHARGED	
E2.001	E8	2.882	0.231	0.000	0.07		2.4	SURCHARGED	6
E1.002	E3	2.890	0.343	0.000	0.17		6.3	SURCHARGED	
E3.000	E9	2.963	0.503	0.000	0.03		2.1	FLOOD RISK	53
E1.003	E4	2.959	0.571	0.000	0.13		8.3	SURCHARGED	6
E4.000	E10	2.879	-0.068	0.000	0.07		0.9	OK	6
E5.000	E14	2.879	-0.041	0.000	0.07		0.9	OK	6
E4.001	E11	2.911	0.044	0.000	0.07		2.8	SURCHARGED	1
E6.000	E15	2.916	0.226	0.000	0.09		1.0	SURCHARGED	5
E4.002	E12	2.907	0.260	0.000	0.16		5.9	SURCHARGED	
E4.003	E13	3.008	0.581	0.000	0.11		4.1	SURCHARGED	40
E1.004	E5	3.052	0.789	0.000	0.11		7.3	SURCHARGED	9
E1.005	E6	3.166	1.093	0.000	0.07		4.5	SURCHARGED	51

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
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, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
E1.000	E1	60 Winter	30	+0%	30/15 Summer	100/15 Summer		
E1.001	E2	120 Summer	30	+0%	1/15 Winter			
E2.000	E7	60 Winter	30	+0%	1/60 Winter			
E2.001	E8	1440 Summer	30	+0%	1/15 Winter	30/1440 Winter		
E1.002	E3	1440 Summer	30	+0%	1/15 Summer			
E3.000	E9	120 Winter	30	+0%	1/15 Summer	1/120 Winter		
E1.003	E4	720 Winter	30	+0%	1/15 Summer	30/120 Summer		
E4.000	E10	60 Winter	30	+0%	30/15 Summer	100/15 Summer		
E5.000	E14	60 Winter	30	+0%	30/15 Summer	100/15 Summer		
E4.001	E11	60 Winter	30	+0%	1/60 Winter	100/30 Summer		
E6.000	E15	60 Winter	30	+0%	1/30 Summer	100/15 Summer		
E4.002	E12	60 Winter	30	+0%	1/15 Winter			
E4.003	E13	1440 Summer	30	+0%	1/15 Summer	30/15 Summer		
E1.004	E5	1440 Summer	30	+0%	1/15 Summer	30/120 Summer		
E1.005	E6	1440 Winter	30	+0%	1/15 Summer	1/480 Summer		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
E1.000	E1	3.354	0.404	0.000	0.29		10.7	SURCHARGED	3
E1.001	E2	3.382	0.709	0.000	0.29		10.5	SURCHARGED	
E2.000	E7	3.324	0.502	0.000	0.26		9.6	SURCHARGED	
E2.001	E8	3.373	0.722	0.000	0.04		1.5	FLOOD RISK	6
E1.002	E3	3.436	0.889	0.000	0.09		3.4	SURCHARGED	
E3.000	E9	3.061	0.601	60.809	0.36		21.9	FLOOD	53
E1.003	E4	3.577	1.189	0.000	0.17		11.1	FLOOD RISK	6
E4.000	E10	3.542	0.595	0.000	0.50		6.5	FLOOD RISK	6
E5.000	E14	3.548	0.628	0.000	0.52		6.5	FLOOD RISK	6
E4.001	E11	3.558	0.691	0.000	0.45		16.6	FLOOD RISK	1
E6.000	E15	3.598	0.908	0.000	0.69		8.5	FLOOD RISK	5
E4.002	E12	3.582	0.935	0.000	0.63		23.5	FLOOD RISK	
E4.003	E13	3.621	1.194	1.563	0.08		2.9	FLOOD	40
E1.004	E5	3.851	1.588	1.721	0.14		9.2	FLOOD	9
E1.005	E6	3.783	1.710	3.808	0.08		4.9	FLOOD	51

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
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, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
E1.000	E1	15 Winter	100	+30%	30/15 Summer	100/15 Summer		
E1.001	E2	15 Winter	100	+30%	1/15 Winter			
E2.000	E7	15 Winter	100	+30%	1/60 Winter			
E2.001	E8	30 Winter	100	+30%	1/15 Winter	30/1440 Winter		
E1.002	E3	2160 Winter	100	+30%	1/15 Summer			
E3.000	E9	180 Winter	100	+30%	1/15 Summer	1/120 Winter		
E1.003	E4	1440 Summer	100	+30%	1/15 Summer	30/120 Summer		
E4.000	E10	30 Winter	100	+30%	30/15 Summer	100/15 Summer		
E5.000	E14	30 Winter	100	+30%	30/15 Summer	100/15 Summer		
E4.001	E11	30 Summer	100	+30%	1/60 Winter	100/30 Summer		
E6.000	E15	30 Winter	100	+30%	1/30 Summer	100/15 Summer		
E4.002	E12	30 Summer	100	+30%	1/15 Winter			
E4.003	E13	60 Winter	100	+30%	1/15 Summer	30/15 Summer		
E1.004	E5	2160 Winter	100	+30%	1/15 Summer	30/120 Summer		
E1.005	E6	1440 Summer	100	+30%	1/15 Summer	1/480 Summer		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
E1.000	E1	3.751	0.801	0.556	0.70		26.3	FLOOD	3
E1.001	E2	3.634	0.961	0.000	1.01		36.2	FLOOD RISK	
E2.000	E7	3.604	0.782	0.000	0.72		26.3	FLOOD RISK	
E2.001	E8	3.504	0.853	3.867	0.88		31.0	FLOOD	6
E1.002	E3	3.557	1.010	0.000	0.11		3.9	FLOOD RISK	
E3.000	E9	3.148	0.688	148.454	0.52		31.1	FLOOD	53
E1.003	E4	3.681	1.293	4.063	0.11		7.2	FLOOD	6
E4.000	E10	3.802	0.855	1.851	1.01		13.2	FLOOD	6
E5.000	E14	3.802	0.882	1.864	1.16		14.5	FLOOD	6
E4.001	E11	3.850	0.983	0.037	0.73		27.0	FLOOD	1
E6.000	E15	3.801	1.111	0.779	1.05		12.9	FLOOD	5
E4.002	E12	3.842	1.195	0.000	1.04		38.7	FLOOD RISK	
E4.003	E13	3.623	1.196	3.494	1.30		47.3	FLOOD	40
E1.004	E5	3.851	1.588	1.840	0.13		8.5	FLOOD	9
E1.005	E6	3.785	1.712	4.840	0.08		5.0	FLOOD	51

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