

Reference: ST-2981/210601-LLFA Response

Response to the LLFA Conditions to  
Planning Application No. 210965

Introduction

This document is prepared in support of a planning application for a proposed development of land off Richard Avenue, Wivenhoe. The document provides further information relating to the proposed SuDS Scheme as indicated in the LLFA letter dated 4<sup>th</sup> May 2021.

The latest response from the LLFA identifies that the following items remain outstanding, with Stomor's associated response provided:

*"Within the greenfield runoff rate calculations, the Soil Type was edited from 1 to 4. A Soil Type of 4 is commonly associated with clayey or loamy soils, whereas on reviewing the ground investigations gravelly sand, or slightly gravelly sand and clay were found which is more in line with Soil Types 2 or 3. The greenfield runoff rates should be updated accordingly. This is especially important as the site is within a Critical Drainage Area."*

**Soil Type 4 was used as the geotechnical report identified a high groundwater table across the site and therefore may preclude the viability of infiltration methods. Notwithstanding this, the soil type has been amended from Soil Type 4 to Soil Type 2 in order to provide a worst-case scenario, and the drainage strategy has been amended in order to accommodate this.**

*"The greenfield runoff rates are based off of a contributing area of 4.9ha whereas the area used for the storage calculations is 3.4ha. It should be explained what the contributing area is made up of and why this wasn't included within the preliminary modelling/storage calculations. This area should be consistent and the greenfield runoff rates should be based on the true contributing area pre-urban creep allowance. This is especially important as the site is within a Critical Drainage Area."*

**The contributing greenfield area for calculating the greenfield runoff rates has been reduced to 3.4ha.**

*"In line with the Essex SuDS Design Guide 2020, rainwater harvesting should be utilised as much as possible throughout the site. This is especially important as the site is within a Critical Drainage Area."*

**Sufficient space has been left for rainwater harvesting infrastructure and the suggestion of inclusion has been passed on to the developer.**





ALEXANDRA DRIVE

ETL

Connection to Woodland

Potential Future Connection

**KEY**

- SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED FOUL WATER SEWER
- PROPOSED FOUL WATER MANHOLE
- EXISTING PUBLIC FOUL WATER SEWER
- EXISTING PUBLIC SURFACE WATER SEWER
- PROPOSED LINED FILTER DRAIN
- PROPOSED LINED POROUS PAVING
- PROPOSED SW ATTENUATION BASIN
- PROPOSED LINED SWALE
- PROPOSED BUND
- OVERLAND FLOW ROUTES
- EXCEEDANCE FLOW ROUTES

DUE TO THE PRESENCE OF HIGH GROUNDWATER ALL SUDS FEATURES ARE TO BE SUITABLY LINED. THE ATTENUATION BASIN IS LIKELY TO REQUIRE A PUDDLED CLAY LAYER TO PREVENT INGRESS OF GROUNDWATER. SPECIALIST ADVICE FROM GEOTECHNICAL ENGINEER REQUIRED

THIS IS AN INDICATIVE DRAINAGE STRATEGY AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. DRAINAGE PROPOSALS INCLUDING PIPE SIZES & INVERT LEVELS ARE SUBJECT TO DETAILED DESIGN. THE ACTUAL POSITION AND DETAILS OF ANY EXISTING SERVICES ARE SUBJECT TO A DETAILED SURVEY.

Rev	Description	Date	Drawn	Checked	Approved
C	Basin Updated to Suit Revised Discharge Rate	03.06.21	JUN	SJB	SJB
B	Drainage Strategy Updated to Suit Revised Layout	11.03.21	JUN	BDR	SJB
A	Drainage Strategy Updated to Suit Revised Layout	12.02.21	JUN	BDK	BDK

Wivenhoe, Land Off Richard Avenue

Indicative Drainage Strategy

Drawing Number: ST-2981-01-C | Scale: 1:500@A1 | Date: 21.07.20 | Drawn: BDR | Checked: SJB | Approved: XXX

Client: **Taylor Wimpey** ARCHITECT

**stomor** CIVIL ENGINEERING CONSULTANTS

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Insets between the North and South parcels of the site can be used to drain excess flow, whilst utilising the green band beneath the overhead cables



Porous Paving to be used for all private driveways to provide water quality treatment in accordance with CIRIA Guidelines



Proposed filter trench will drain runoff from shared private drives where possible.

Basin to be suitably lined to prevent ingress of groundwater. PERMANENT WET AREA OR BOYCOTTER AREA REQUIRED TO PROVIDE SUFFICIENT WATER TREATMENT

PROPOSED FLOW CONTROL DEVICE LIMITING SW DISCHARGE TO 4L/S FOR ALL DISCHARGE TO ACCORDANCE WITH ANGLIAN WATER REQUIREMENTS

3rd PARTY LAND OWNER APPROVAL OR SEWER REGISTRATION REQUIRED FOR FW SEWERS LAID OUTSIDE OF SITE BOUNDARY

PROPOSED SW SEWER CONNECTION SECTION 106 APPROVAL REQUIRED FROM ANGLIAN WATER FOR SEWER CONNECTION

PROPOSED FW SEWER CONNECTION SECTION 106 APPROVAL REQUIRED FROM ANGLIAN WATER. IT MAY BE NECESSARY TO CONSTRUCT A NEW MANHOLE UPSTREAM DUE TO THE EXISTING NUMBER OF SEWER CONNECTIONS. TO BE DETERMINED AT DETAILED DESIGN.

SCALE BAR 1:500





Existing Network Details for Surface Network 1

\* - Indicates pipe has been modified outside of System 1  
# - Indicates pipe length does not match coordinates

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
* 1.000	56.894	0.285	199.6	0.129	5.00	0.600	o	300	Pipe/Conduit
* 2.000	12.781	0.060	213.0	0.129	5.00	0.600	o	300	Pipe/Conduit
* 1.001	46.862	0.231	202.9	0.129	0.00	0.600	o	525	Pipe/Conduit
* 3.000	28.687	0.691	41.5	0.129	5.00	0.600	o	300	Pipe/Conduit
* 1.002	21.380	0.117	182.7	0.129	0.00	0.600	o	525	Pipe/Conduit
* 1.003	14.401	0.057	252.6	0.129	0.00	0.600	o	525	Pipe/Conduit
* 1.004	26.193	0.105	249.5	0.129	0.00	0.600	o	525	Pipe/Conduit
* 1.005	32.331	0.129	250.6	0.129	0.00	0.600	o	600	Pipe/Conduit
* 1.006	16.111	0.065	247.9	0.129	0.00	0.600	o	600	Pipe/Conduit
* 4.000	25.696	0.128	200.8	0.129	5.00	0.600	o	300	Pipe/Conduit
* 4.001	24.030	0.236	101.8	0.129	0.00	0.600	o	375	Pipe/Conduit
* 1.007	18.451	0.061	302.5	0.129	0.00	0.600	o	675	Pipe/Conduit
* 1.008	20.972	0.070	299.6	0.129	0.00	0.600	o	675	Pipe/Conduit
* 1.009	9.310	0.031	300.3	0.129	0.00	0.600	o	750	Pipe/Conduit
* 5.000	16.482	0.110	149.8	0.129	5.00	0.600	o	300	Pipe/Conduit
* 5.001	28.395	0.284	100.0	0.129	0.00	0.600	o	300	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
* 1.000	S1	31.880	30.050	1.530	31.800	29.765	1.735		1200
* 2.000	S2	31.800	29.900	1.600	31.800	29.840	1.660		1200
* 1.001	S3	31.800	29.615	1.660	31.744	29.384	1.835		1500
* 3.000	S4	31.858	30.300	1.258	31.744	29.609	1.835		1200
* 1.002	S5	31.744	29.384	1.835	31.764	29.267	1.972		1500
* 1.003	S6	31.764	29.267	1.972	31.731	29.210	1.996		1500
* 1.004	S7	31.731	29.210	1.996	31.590	29.105	1.960		1500
* 1.005	S8	31.590	29.030	1.960	31.222	28.901	1.721		1500
* 1.006	S9	31.222	28.901	1.721	31.209	28.836	1.773		1500
* 4.000	S10	30.868	29.500	1.068	31.039	29.372	1.367		1200
* 4.001	S11	31.039	29.297	1.367	31.209	29.061	1.773		1500
* 1.007	S12	31.209	28.761	1.773	31.264	28.700	1.889		1500
* 1.008	S13	31.264	28.700	1.889	31.272	28.630	1.967		1500
* 1.009	S14	31.272	28.555	1.967	31.222	28.524	1.948		1800
* 5.000	S16	31.336	29.900	1.136	31.203	29.790	1.113		1200
* 5.001	S17	31.203	29.790	1.113	30.912	29.506	1.106		1200




Existing Network Details for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
* 5.002	27.353	0.751	36.4	0.129	0.00	0.600	o	375	Pipe/Conduit
* 1.010	58.684	0.147	399.2	0.129	0.00	0.600	o	900	Pipe/Conduit
* 6.000	19.570	0.085	230.2	0.129	5.00	0.600	o	300	Pipe/Conduit
* 6.001	39.462	0.158	249.8	0.129	0.00	0.600	o	375	Pipe/Conduit
* 1.011	17.591	0.327	53.8	0.129	0.00	0.600	o	900	Pipe/Conduit
* 7.000	54.222	0.217	249.9	0.129	5.00	0.600	o	450	Pipe/Conduit
* 1.012	33.812	0.085	397.8	0.129	0.00	0.600	o	900	Pipe/Conduit
* 8.000	32.323	0.324	99.8	0.129	5.00	0.600	o	300	Pipe/Conduit
* 1.013	17.073	0.042	406.5	0.129	0.00	0.600	o	900	Pipe/Conduit
* 1.014	47.628	0.000	0.0	0.170	0.00	0.600	o	300	Pipe/Conduit
* 1.015	18.600#	0.100	186.0	0.000	0.00	0.600	o	300	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
* 5.002	S18	30.912	29.431	1.106	31.222	28.680	2.167		1500
* 1.010	S19	31.222	28.374	1.948	30.876	28.227	1.749		1800
* 6.000	S20	30.570	29.070	1.200	30.844	28.985	1.559		1200
* 6.001	S21	30.844	28.910	1.559	30.876	28.752	1.749		1500
* 1.011	S22	30.876	28.227	1.749	30.805	27.900	2.005		1800
* 7.000	S23	30.276	28.642	1.184	30.805	28.425	1.930		1500
* 1.012	S24	30.805	27.900	2.005	30.686	27.815	1.971		1800
* 8.000	S25	30.511	28.712	1.499	30.686	28.388	1.998		1200
* 1.013	S26	30.686	27.815	1.971	30.200	27.773	1.527		1800
* 1.014	Basin	30.200	27.600	2.300	30.300	27.600	2.400	Hydro-Brake®	1800
* 1.015	F/C	30.300	27.600	2.400	29.114	27.500	1.314		1200

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	S29	29.114	27.500	0.000	1200	0

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Micro Drainage	Network 2019.1	

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	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 Surface Network 1


Hydro-Brake® Optimum Manhole: Basin, DS/PN: 1.014, Volume (m³): 16.3

Unit Reference	MD-SHE-0077-4000-2600-4000
Design Head (m)	2.600
Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	27.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.600	4.0	Kick-Flo®	0.682	2.2
Flush-Flo™	0.335	2.7	Mean Flow over Head Range	-	3.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	0.800	2.3	2.000	3.5	4.000	4.9	7.000	6.4
0.200	2.6	1.000	2.6	2.200	3.7	4.500	5.2	7.500	6.6
0.300	2.7	1.200	2.8	2.400	3.8	5.000	5.4	8.000	6.8
0.400	2.7	1.400	3.0	2.600	4.0	5.500	5.7	8.500	7.0
0.500	2.6	1.600	3.2	3.000	4.3	6.000	5.9	9.000	7.2
0.600	2.4	1.800	3.4	3.500	4.6	6.500	6.1	9.500	7.3

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Storage Structures for Surface Network 1

Complex Manhole: Basin, DS/PN: 1.014

Tank or Pond

Invert Level (m) 27.600

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	502.3	0.601	812.8	1.601	1354.8
0.600	643.4	1.600	1138.2	2.600	1750.7

Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
 Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
 Hot Start Level (mm) 0    Inlet Coefficient 0.800  
 Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
 Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

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

Margin for Flood Risk Warning (mm)    250.0  
 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, 240, 360, 480, 960, 1440  
 Return Period(s) (years) 100  
 Climate Change (%) 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	S1	15 Winter	100	+30%	100/15 Summer				31.274	0.924
2.000	S2	15 Winter	100	+30%	100/15 Summer				31.217	1.017
1.001	S3	15 Winter	100	+30%	100/15 Summer				31.113	0.973
3.000	S4	15 Winter	100	+30%	100/15 Summer				31.162	0.562
1.002	S5	15 Winter	100	+30%	100/15 Summer				30.967	1.058
1.003	S6	15 Winter	100	+30%	100/15 Summer				30.852	1.060
1.004	S7	15 Winter	100	+30%	100/15 Summer				30.707	0.972
1.005	S8	15 Winter	100	+30%	100/15 Summer				30.509	0.879
1.006	S9	15 Winter	100	+30%	100/15 Summer				30.355	0.854
4.000	S10	15 Winter	100	+30%	100/15 Summer				30.420	0.620
4.001	S11	15 Winter	100	+30%	100/15 Summer				30.318	0.646
1.007	S12	15 Winter	100	+30%	100/15 Summer				30.166	0.730
1.008	S13	1440 Winter	100	+30%	100/15 Summer				29.964	0.589
1.009	S14	1440 Winter	100	+30%	100/15 Summer				29.964	0.659
5.000	S16	15 Winter	100	+30%	100/15 Summer				30.453	0.253
5.001	S17	15 Winter	100	+30%	100/15 Summer				30.351	0.261
5.002	S18	1440 Winter	100	+30%	100/960 Winter				29.964	0.158
1.010	S19	1440 Winter	100	+30%	100/15 Summer				29.964	0.690
6.000	S20	1440 Winter	100	+30%	100/15 Summer				29.964	0.594
6.001	S21	1440 Winter	100	+30%	100/15 Summer				29.964	0.679
1.011	S22	1440 Winter	100	+30%	100/15 Summer				29.964	0.837
7.000	S23	1440 Winter	100	+30%	100/15 Summer				29.963	0.871
1.012	S24	1440 Winter	100	+30%	100/15 Summer				29.963	1.163
8.000	S25	1440 Winter	100	+30%	100/15 Winter				29.963	0.951
1.013	S26	1440 Winter	100	+30%	100/15 Summer				29.963	1.248
1.014	Basin	1440 Winter	100	+30%	100/15 Summer				29.963	2.063
1.015	F/C	1440 Winter	100	+30%					27.645	-0.255





Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	0.73	54.2	SURCHARGED	
2.000	S2	0.000	0.96	59.0	SURCHARGED	
1.001	S3	0.000	0.50	151.4	SURCHARGED	
3.000	S4	0.000	0.41	64.6	SURCHARGED	
1.002	S5	0.000	0.96	251.9	SURCHARGED	
1.003	S6	0.000	1.35	297.9	SURCHARGED	
1.004	S7	0.000	1.38	343.6	SURCHARGED	
1.005	S8	0.000	1.08	387.6	SURCHARGED	
1.006	S9	0.000	1.38	431.4	SURCHARGED	
4.000	S10	0.000	0.86	60.0	SURCHARGED	
4.001	S11	0.000	0.65	111.5	SURCHARGED	
1.007	S12	0.000	1.52	584.9	SURCHARGED	
1.008	S13	0.000	0.11	42.3	SURCHARGED	
1.009	S14	0.000	0.11	45.0	SURCHARGED	
5.000	S16	0.000	0.90	69.6	SURCHARGED	
5.001	S17	0.000	1.37	137.7	SURCHARGED	
5.002	S18	0.000	0.03	9.8	SURCHARGED	
1.010	S19	0.000	0.07	57.4	SURCHARGED	
6.000	S20	0.000	0.05	3.2	SURCHARGED	
6.001	S21	0.000	0.06	6.3	SURCHARGED	
1.011	S22	0.000	0.05	66.3	SURCHARGED	
7.000	S23	0.000	0.02	3.2	SURCHARGED	
1.012	S24	0.000	0.10	72.3	SURCHARGED	
8.000	S25	0.000	0.03	3.2	SURCHARGED	
1.013	S26	0.000	0.14	78.4	SURCHARGED	
1.014	Basin	0.000	0.12	3.8	FLOOD RISK	
1.015	F/C	0.000	0.05	3.8	OK	



Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
 Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
 Hot Start Level (mm) 0    Inlet Coefficient 0.800  
 Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
 Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

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

Margin for Flood Risk Warning (mm)    250.0  
 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, 240, 360, 480, 960, 1440  
 Return Period(s) (years)    30  
 Climate Change (%)    0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	S1	15 Winter	30	+0%					30.212	-0.138
2.000	S2	15 Winter	30	+0%					30.083	-0.117
1.001	S3	15 Winter	30	+0%					29.945	-0.195
3.000	S4	15 Winter	30	+0%					30.406	-0.194
1.002	S5	15 Winter	30	+0%					29.884	-0.025
1.003	S6	15 Winter	30	+0%	30/15 Winter				29.810	0.018
1.004	S7	15 Winter	30	+0%	30/15 Winter				29.757	0.022
1.005	S8	15 Winter	30	+0%	30/15 Summer				29.647	0.017
1.006	S9	15 Winter	30	+0%	30/15 Summer				29.543	0.042
4.000	S10	15 Winter	30	+0%					29.668	-0.132
4.001	S11	15 Winter	30	+0%					29.502	-0.170
1.007	S12	15 Winter	30	+0%	30/15 Winter				29.438	0.002
1.008	S13	15 Winter	30	+0%	30/15 Winter				29.376	0.001
1.009	S14	15 Winter	30	+0%					29.305	0.000
5.000	S16	15 Winter	30	+0%					30.059	-0.141
5.001	S17	15 Winter	30	+0%					30.006	-0.084
5.002	S18	15 Winter	30	+0%					29.607	-0.199
1.010	S19	1440 Winter	30	+0%					29.274	0.000
6.000	S20	1440 Winter	30	+0%					29.270	-0.100
6.001	S21	1440 Winter	30	+0%					29.270	-0.015
1.011	S22	1440 Winter	30	+0%	30/960 Winter				29.270	0.143
7.000	S23	1440 Winter	30	+0%	30/480 Winter				29.270	0.178
1.012	S24	1440 Winter	30	+0%	30/120 Winter				29.270	0.470
8.000	S25	1440 Winter	30	+0%	30/360 Winter				29.270	0.258
1.013	S26	1440 Winter	30	+0%	30/120 Summer				29.270	0.555
1.014	Basin	1440 Winter	30	+0%	30/15 Summer				29.270	1.370
1.015	F/C	1440 Winter	30	+0%					27.641	-0.259





Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	0.54	40.3	OK	
2.000	S2	0.000	0.68	41.6	OK	
1.001	S3	0.000	0.40	119.6	OK	
3.000	S4	0.000	0.27	41.7	OK	
1.002	S5	0.000	0.70	182.8	OK	
1.003	S6	0.000	0.97	214.5	SURCHARGED	
1.004	S7	0.000	1.00	247.9	SURCHARGED	
1.005	S8	0.000	0.73	260.6	SURCHARGED	
1.006	S9	0.000	0.90	281.2	SURCHARGED	
4.000	S10	0.000	0.58	40.9	OK	
4.001	S11	0.000	0.49	83.8	OK	
1.007	S12	0.000	0.95	363.9	SURCHARGED	
1.008	S13	0.000	0.97	387.6	SURCHARGED	
1.009	S14	0.000	1.04	414.2	OK	
5.000	S16	0.000	0.54	41.6	OK	
5.001	S17	0.000	0.84	84.4	OK	
5.002	S18	0.000	0.44	128.1	OK	
1.010	S19	0.000	0.04	35.5	OK	
6.000	S20	0.000	0.03	2.0	OK	
6.001	S21	0.000	0.03	4.0	OK	
1.011	S22	0.000	0.03	41.3	SURCHARGED	
7.000	S23	0.000	0.01	2.0	SURCHARGED	
1.012	S24	0.000	0.06	45.2	SURCHARGED	
8.000	S25	0.000	0.02	2.0	SURCHARGED	
1.013	S26	0.000	0.09	49.2	SURCHARGED	
1.014	Basin	0.000	0.10	3.2	SURCHARGED	
1.015	F/C	0.000	0.05	3.2	OK	



Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
 Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
 Hot Start Level (mm) 0    Inlet Coefficient 0.800  
 Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
 Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

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

Margin for Flood Risk Warning (mm)    250.0  
 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, 240, 360, 480, 960, 1440  
 Return Period(s) (years) 1  
 Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
									Level (m)	Depth (m)
1.000	S1	15 Winter	1	+0%					30.147	-0.203
2.000	S2	15 Winter	1	+0%					30.008	-0.192
1.001	S3	15 Winter	1	+0%					29.755	-0.385
3.000	S4	15 Winter	1	+0%					30.366	-0.234
1.002	S5	15 Winter	1	+0%					29.579	-0.330
1.003	S6	15 Winter	1	+0%					29.502	-0.290
1.004	S7	15 Winter	1	+0%					29.447	-0.288
1.005	S8	15 Winter	1	+0%					29.268	-0.362
1.006	S9	15 Winter	1	+0%					29.167	-0.334
4.000	S10	15 Winter	1	+0%					29.600	-0.200
4.001	S11	15 Winter	1	+0%					29.405	-0.267
1.007	S12	15 Winter	1	+0%					29.073	-0.363
1.008	S13	15 Winter	1	+0%					29.013	-0.362
1.009	S14	15 Winter	1	+0%					28.915	-0.390
5.000	S16	15 Winter	1	+0%					29.996	-0.204
5.001	S17	15 Winter	1	+0%					29.905	-0.185
5.002	S18	15 Winter	1	+0%					29.530	-0.276
1.010	S19	15 Winter	1	+0%					28.698	-0.576
6.000	S20	15 Winter	1	+0%					29.176	-0.194
6.001	S21	15 Winter	1	+0%					29.043	-0.242
1.011	S22	1440 Winter	1	+0%					28.539	-0.588
7.000	S23	15 Winter	1	+0%					28.734	-0.358
1.012	S24	1440 Winter	1	+0%					28.539	-0.261
8.000	S25	15 Winter	1	+0%					28.794	-0.218
1.013	S26	1440 Winter	1	+0%					28.539	-0.176
1.014	Basin	1440 Winter	1	+0%	1/15 Summer				28.538	0.638
1.015	F/C	1440 Winter	1	+0%					27.638	-0.262





Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	0.23	17.2	OK	
2.000	S2	0.000	0.28	16.9	OK	
1.001	S3	0.000	0.16	47.6	OK	
3.000	S4	0.000	0.11	17.0	OK	
1.002	S5	0.000	0.29	77.0	OK	
1.003	S6	0.000	0.41	90.9	OK	
1.004	S7	0.000	0.42	103.9	OK	
1.005	S8	0.000	0.32	114.7	OK	
1.006	S9	0.000	0.41	126.9	OK	
4.000	S10	0.000	0.24	16.7	OK	
4.001	S11	0.000	0.18	31.3	OK	
1.007	S12	0.000	0.43	164.3	OK	
1.008	S13	0.000	0.44	175.3	OK	
1.009	S14	0.000	0.46	185.1	OK	
5.000	S16	0.000	0.22	17.0	OK	
5.001	S17	0.000	0.31	31.4	OK	
5.002	S18	0.000	0.16	45.8	OK	
1.010	S19	0.000	0.28	230.3	OK	
6.000	S20	0.000	0.26	16.7	OK	
6.001	S21	0.000	0.27	31.3	OK	
1.011	S22	0.000	0.02	20.0	OK	
7.000	S23	0.000	0.09	17.1	OK	
1.012	S24	0.000	0.03	21.5	OK	
8.000	S25	0.000	0.16	16.7	OK	
1.013	S26	0.000	0.04	22.7	OK	
1.014	Basin	0.000	0.08	2.7	SURCHARGED	
1.015	F/C	0.000	0.04	2.7	OK	