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Contract	Job No.
Langstone Technology Park Surface water runoff calcs	13055
	Date. 26/03/21
Part of Structure: Rainfall intensity	Page No. 1/4

Member Ref.	Calculations	Output
	IN ACCORDANCE WITH CLANCY FLOOD RISK ASSESSMENT + SUDS STRATEG AND THE WALLINGFORD PROCEDURE : DESIGN RAINFALL INTENSITY 1yr : Imax = 28.7 mm/hr 30yr : Imax = 70.4 mm/hr 100yr : Imax = 90.8 mm/hr.	

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Contract	Job No.
Langstone Technology Park. Surface Water runoff calcs.	13055
	Date. 26/03/21
Part of Structure: Area 1	Page No. 2/4

Member Ref.	Calculations	Output

AREA 1

Maximum surface water runoff:

1 year: (I_{max} = 28.7mm/hr)

Existing Impermeable area = 0.170ha.

∴ Maximum surface water runoff (Qmax) = CiA.

∴ Qmax = 2.78 × 28.7 × 0.170

= 13.6 l/s

30year (I_{max} = 70.4mm/hr)

Existing impermeable area = 0.170ha.

∴ Qmax = 2.78 × 70.4 × 0.170

= 33.27 l/s.

100yr (I_{max} = 90.8mm/hr)

Existing impermeable area = 0.170ha.

∴ Qmax = 2.78 × 90.8 × 0.170

= 42.91 l/s

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Contract	Job No.
Langstone Technology Park Surface water runoff calcs	13055
	Date. 26/03/21
Part of Structure: Area 2.	Page No. 3/4.

Member Ref.	Calculations	Output

① Area 2 : Development West of ex. car park:

Max. Surface water runoff.

1 year (imax = 28.7mm/hr)

Existing impermeable area : 2.115 Ha

Maximum surface water runoff (Qmax) = CiA.

∴ Qmax = 2.78 x 28.7 x 2.115 Ha

= 168.7 l/s.

30 year (imax = 70.4mm/hr)

Ex. Impermeable area : 2.115 Ha.

∴ Qmax = 2.78 x 70.4 x 2.115

= 413.9 l/s.

100 year (imax = 90.8mm/hr)

Ex. Impermeable area : 2.115 Ha.

∴ Qmax = 2.78 x 90.8 x 2.115

= 533.9 l/s.

② Area 2 : Ex. Car Park.

Max. Surface water runoff.

1 year (imax = 28.7mm/hr)

Ex. Impermeable area draining to existing network : 0.239 Ha.

∴ Qmax = 2.78 x 28.7 x 0.239

= 19.1 l/s.

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Contract	Job No.
Langstone Technology Park. Surface Water runoff calcs.	13055
	Date. 26/03/21
Part of Structure: Area 2.	Page No. 4/4

Member Ref.	Calculations	Output
	30year (Imax = 70.4mm/hr)	
	Ex Impermeable area draining to existing network : 0.239Ha.	
	∴ Qmax = 2.78 x 70.4 x 0.239	
	= 46.8 l/s	
	100year (Imax = 90.8mm/hr)	
	Ex Impermeable area draining to existing network : 0.239Ha.	
	∴ Qmax = 2.78 x 90.8 x 0.239	
	= 60.3 l/s.	
	In accordance with Clancy FRA + SUDS Strategy (02/07/2019, Ref 8/1982), maximum flow through 375mm discharge pipe = 132 l/s.	
	∴ Existing car park to remain and discharge at existing rate of 19.1 l/s and development area west of existing car park to discharge at 112.9 l/s (132.0 - 19.1).	
	∴ Entire development area 2 is limited to 132.0 l/s as per Clancy FRA + SUDS Strategy (Appendix D).	

Rural Runoff Calculator

IH 124

IH 124 Input

Return Period (Years): 100

Area (ha): 0.163

SAAR (mm): 719

Map

Soil: 0.370

Growth Curve: (None)

Calculate

Partly Urbanised Catchment (QBAR)

Urban: 0.000

Region: Region 7

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required

Results

QBAR rural (l/s): 0.9

QBAR urban (l/s): 0.9

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (2 yrs) (l/s)	Q (5 yrs) (l/s)	Q (10 yrs) (l/s)	Q (20 yrs) (l/s)	Q (25 yrs) (l/s)	Q (30 yrs) (l/s)
Region 1	0.9	2.2	0.8	0.8	1.1	1.3	1.5	1.6	1.7
Region 2	0.9	2.4	0.8	0.8	1.1	1.3	1.5	1.6	1.7
Region 3	0.9	1.9	0.8	0.9	1.1	1.3	1.5	1.5	1.6
Region 4	0.9	2.3	0.8	0.8	1.1	1.4	1.6	1.7	1.8
Region 5	0.9	3.2	0.8	0.8	1.2	1.5	1.9	2.1	2.2
Region 6/Region 7	0.9	2.9	0.8	0.8	1.2	1.5	1.8	1.9	2.1
Region 8	0.9	2.2	0.7	0.8	1.1	1.4	1.6	1.7	1.7

IH 124
ICP SUDS
ADAS 345
FEH
ReFH2
Greenfield Volume
Greenfield Volume (ReFH2)

OK Cancel Help

Enter Return Period between 1 and 1000

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	40
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	9.667	0.040	241.7	0.034	6.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	31.556	0.130	242.7	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	13.052	0.055	237.3	0.034	6.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	9.545	0.040	238.6	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	13.865	0.020	693.3	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	6.303	0.010	630.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	10.322	0.035	294.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.16	3.760	0.034	0.0	0.0	1.8	1.01	71.2	6.4
1.001	50.00	6.68	3.720	0.068	0.0	0.0	3.7	1.00	71.0	12.9
2.000	50.00	6.21	3.645	0.034	0.0	0.0	1.8	1.02	71.8	6.4
1.002	50.00	6.84	3.590	0.136	0.0	0.0	7.4	1.01	71.6	25.8
1.003	50.00	7.23	3.550	0.170	0.0	0.0	9.2	0.59	41.7	32.2
1.004	50.00	7.38	3.530	0.170	0.0	0.0	9.2	0.71	78.9	32.2
1.005	50.00	7.54	3.520	0.170	0.0	0.0	9.2	1.05	116.0	32.2

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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	5.055	1.295	Open Manhole	1200	1.000	3.760	300				
S2	4.920	1.200	Open Manhole	1200	1.001	3.720	300	1.000	3.720	300	
S3	5.050	1.405	Open Manhole	1200	2.000	3.645	300				
S4	5.275	1.685	Open Manhole	1200	1.002	3.590	300	1.001	3.590	300	
								2.000	3.590	300	
S5	5.385	1.835	Open Manhole	1200	1.003	3.550	300	1.002	3.550	300	
TANK	5.155	1.625	Open Manhole	100	1.004	3.530	375	1.003	3.530	300	
S6	5.095	1.575	Open Manhole	1350	1.005	3.520	375	1.004	3.520	375	
	5.245	1.760	Open Manhole	0		OUTFALL		1.005	3.485	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	471117.706	105681.357	471117.706	105681.357	Required	
S2	471127.367	105681.029	471127.367	105681.029	Required	
S3	471139.182	105649.014	471139.182	105649.014	Required	
S4	471126.140	105649.497	471126.140	105649.497	Required	
S5	471116.600	105649.834	471116.600	105649.834	Required	
TANK	471117.104	105663.690	471117.104	105663.690	Required	
S6	471110.805	105663.919	471110.805	105663.919	Required	
	471100.492	105664.354			No Entry	

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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)
1.000	o	300	S1	5.055	3.760	0.995	Open Manhole	1200
1.001	o	300	S2	4.920	3.720	0.900	Open Manhole	1200
2.000	o	300	S3	5.050	3.645	1.105	Open Manhole	1200
1.002	o	300	S4	5.275	3.590	1.385	Open Manhole	1200
1.003	o	300	S5	5.385	3.550	1.535	Open Manhole	1200
1.004	o	375	TANK	5.155	3.530	1.250	Open Manhole	100
1.005	o	375	S6	5.095	3.520	1.200	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	9.667	241.7	S2	4.920	3.720	0.900	Open Manhole	1200
1.001	31.556	242.7	S4	5.275	3.590	1.385	Open Manhole	1200
2.000	13.052	237.3	S4	5.275	3.590	1.385	Open Manhole	1200
1.002	9.545	238.6	S5	5.385	3.550	1.535	Open Manhole	1200
1.003	13.865	693.3	TANK	5.155	3.530	1.325	Open Manhole	100
1.004	6.303	630.3	S6	5.095	3.520	1.200	Open Manhole	1350
1.005	10.322	294.9		5.245	3.485	1.385	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005		5.245	3.485	0.000	0	0

Simulation Criteria for Storm

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

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

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Simulation Criteria for Storm

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	0.350		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6, DS/PN: 1.005, Volume (m³): 2.9

Unit Reference	MD-SHE-0167-1320-0900-1320
Design Head (m)	0.900
Design Flow (l/s)	13.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	167
Invert Level (m)	3.520
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	13.2	Kick-Flo®	0.638	11.2
Flush-Flo™	0.295	13.1	Mean Flow over Head Range	-	11.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.9	1.200	15.1	3.000	23.4	7.000	35.2
0.200	12.8	1.400	16.3	3.500	25.2	7.500	36.4
0.300	13.1	1.600	17.3	4.000	26.9	8.000	37.5
0.400	13.0	1.800	18.3	4.500	28.4	8.500	38.7
0.500	12.6	2.000	19.3	5.000	29.9	9.000	39.7
0.600	11.8	2.200	20.2	5.500	31.3	9.500	40.7
0.800	12.5	2.400	21.0	6.000	32.7		
1.000	13.9	2.600	21.8	6.500	33.9		

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Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 1.004

Invert Level (m) 3.220 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	50.0	50.0	0.900	0.0	74.0
0.800	50.0	74.0			

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
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 0.350
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
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	60 Winter	100	+40%	100/15 Summer				4.523
1.001	S2	60 Winter	100	+40%	100/15 Summer				4.520
2.000	S3	60 Winter	100	+40%	30/15 Summer				4.516
1.002	S4	60 Winter	100	+40%	30/15 Summer				4.512
1.003	S5	60 Winter	100	+40%	30/15 Summer				4.504
1.004	TANK	60 Winter	100	+40%	100/30 Summer				4.491
1.005	S6	60 Winter	100	+40%	100/30 Summer				4.488

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.463	0.000	0.19			10.4	SURCHARGED	
1.001	S2	0.500	0.000	0.32			20.7	SURCHARGED	
2.000	S3	0.571	0.000	0.18			10.4	SURCHARGED	
1.002	S4	0.622	0.000	0.75			41.5	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	S5	0.654	0.000	2.28			51.8	SURCHARGED	
1.004	TANK	0.586	0.000	0.25		56	18.0	SURCHARGED	
1.005	S6	0.593	0.000	0.16			13.6	SURCHARGED	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	40
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	17.129	0.030	571.0	0.265	6.00	0.0	0.600	o	600	Pipe/Conduit	
1.001	13.800	0.030	460.0	0.083	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.002	9.144	0.015	609.6	0.080	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.003	13.795	0.030	459.8	0.020	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.004	8.894	0.015	592.9	0.044	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.005	26.562	0.010	2656.2	0.456	0.00	0.0	0.600	o	600	Pipe/Conduit	
2.000	18.632	0.070	266.2	0.023	6.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	9.324	0.040	233.1	0.030	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	33.657	0.095	354.3	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.28	3.520	0.265	0.0	0.0	14.4	1.01	286.1	50.2
1.001	50.00	6.49	3.490	0.348	0.0	0.0	18.8	1.13	319.2	66.0
1.002	50.00	6.64	3.460	0.428	0.0	0.0	23.2	0.98	276.8	81.1
1.003	50.00	6.85	3.445	0.448	0.0	0.0	24.3	1.13	319.2	84.9
1.004	50.00	6.99	3.415	0.492	0.0	0.0	26.6	0.99	280.7	93.3
1.005	50.00	7.95	3.400	0.948	0.0	0.0	51.3	0.46	130.9«	179.7
2.000	50.00	6.39	3.595	0.023	0.0	0.0	1.2	0.80	31.7	4.4
2.001	50.00	6.57	3.525	0.053	0.0	0.0	2.9	0.85	33.9	10.0
2.002	50.00	7.39	3.485	0.066	0.0	0.0	3.6	0.69	27.4	12.5

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	19.490	0.050	389.8	0.333	6.00	0.0	0.600	o	450	Pipe/Conduit	
3.001	30.736	0.035	878.2	0.304	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	30.498	0.095	321.0	0.181	6.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	26.182	0.015	1745.5	0.147	6.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	29.145	0.060	485.8	0.136	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.007	5.851	0.015	390.1	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	61.470	0.185	332.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.009	34.390	0.100	343.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	6.32	3.475	0.333	0.0	0.0	18.0	1.02	162.8	63.1
3.001	50.00	7.07	3.425	0.637	0.0	0.0	34.5	0.68	107.8«	120.8
4.000	50.00	6.58	3.485	0.181	0.0	0.0	9.8	0.87	61.6	34.3
5.000	50.00	7.19	3.400	0.147	0.0	0.0	8.0	0.37	26.0«	27.9
1.006	50.00	8.43	3.390	2.115	0.0	0.0	114.6	1.01	218.5«	401.0
1.007	50.00	8.52	3.330	2.115	0.0	0.0	114.6	1.13	244.2«	401.0
1.008	50.00	9.36	3.315	2.115	0.0	0.0	114.6	1.22	264.8«	401.0
1.009	50.00	9.83	3.130	2.115	0.0	0.0	114.6	1.20	260.2«	401.0

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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	5.320	1.800	Open Manhole	1500	1.000	3.520	600				
S2	5.290	1.800	Open Manhole	1500	1.001	3.490	600	1.000	3.490	600	
S3	5.270	1.810	Open Manhole	1500	1.002	3.460	600	1.001	3.460	600	
S4	5.270	1.825	Open Manhole	1500	1.003	3.445	600	1.002	3.445	600	
S5	5.270	1.855	Open Manhole	1500	1.004	3.415	600	1.003	3.415	600	
S6	5.270	1.870	Open Manhole	1500	1.005	3.400	600	1.004	3.400	600	
S7	5.275	1.680	Open Manhole	1200	2.000	3.595	225				
S8	5.280	1.755	Open Manhole	1200	2.001	3.525	225	2.000	3.525	225	
S9	5.285	1.800	Open Manhole	1200	2.002	3.485	225	2.001	3.485	225	
S10	5.125	1.650	Open Manhole	1350	3.000	3.475	450				
S11	5.125	1.700	Open Manhole	1350	3.001	3.425	450	3.000	3.425	450	
S12	5.250	1.765	Open Manhole	1200	4.000	3.485	300				
S13	5.150	1.750	Open Manhole	1200	5.000	3.400	300				
TANK	4.990	1.605	Open Manhole	1500	1.006	3.390	525	1.005	3.390	600	
								2.002	3.390	225	
								3.001	3.390	450	
								4.000	3.390	300	
								5.000	3.385	300	
S14	4.870	1.540	Open Manhole	1500	1.007	3.330	525	1.006	3.330	525	
S15	4.980	1.665	Open Manhole	1500	1.008	3.315	525	1.007	3.315	525	
S16	4.950	1.820	Open Manhole	1500	1.009	3.130	525	1.008	3.130	525	
	4.320	1.290	Open Manhole	3000		OUTFALL		1.009	3.030	525	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	471156.325	105618.046	471156.325	105618.046	Required	
S2	471155.669	105600.929	471155.669	105600.929	Required	
S3	471155.144	105587.140	471155.144	105587.140	Required	
S4	471154.796	105578.002	471154.796	105578.002	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S5	471154.268	105564.218	471154.268	105564.218	Required	
S6	471153.927	105555.330	471153.927	105555.330	Required	
S7	471114.978	105486.613	471114.978	105486.613	Required	
S8	471133.115	105490.881	471133.115	105490.881	Required	
S9	471138.896	105498.189	471138.896	105498.189	Required	
S10	471184.250	105551.241	471184.250	105551.241	Required	
S11	471183.506	105531.765	471183.506	105531.765	Required	
S12	471127.349	105545.416	471127.349	105545.416	Required	
S13	471126.752	105529.787	471126.752	105529.787	Required	
TANK	471152.915	105528.787	471152.915	105528.787	Required	
S14	471154.042	105499.664	471154.042	105499.664	Required	
S15	471158.441	105495.806	471158.441	105495.806	Required	
S16	471219.851	105493.084	471219.851	105493.084	Required	
	471254.214	105491.698			No Entry	

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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)
1.000	o	600	S1	5.320	3.520	1.200	Open Manhole	1500
1.001	o	600	S2	5.290	3.490	1.200	Open Manhole	1500
1.002	o	600	S3	5.270	3.460	1.210	Open Manhole	1500
1.003	o	600	S4	5.270	3.445	1.225	Open Manhole	1500
1.004	o	600	S5	5.270	3.415	1.255	Open Manhole	1500
1.005	o	600	S6	5.270	3.400	1.270	Open Manhole	1500
2.000	o	225	S7	5.275	3.595	1.455	Open Manhole	1200
2.001	o	225	S8	5.280	3.525	1.530	Open Manhole	1200
2.002	o	225	S9	5.285	3.485	1.575	Open Manhole	1200
3.000	o	450	S10	5.125	3.475	1.200	Open Manhole	1350
3.001	o	450	S11	5.125	3.425	1.250	Open Manhole	1350
4.000	o	300	S12	5.250	3.485	1.465	Open Manhole	1200
5.000	o	300	S13	5.150	3.400	1.450	Open Manhole	1200
1.006	o	525	TANK	4.990	3.390	1.075	Open Manhole	1500
1.007	o	525	S14	4.870	3.330	1.015	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	17.129	571.0	S2	5.290	3.490	1.200	Open Manhole	1500
1.001	13.800	460.0	S3	5.270	3.460	1.210	Open Manhole	1500
1.002	9.144	609.6	S4	5.270	3.445	1.225	Open Manhole	1500
1.003	13.795	459.8	S5	5.270	3.415	1.255	Open Manhole	1500
1.004	8.894	592.9	S6	5.270	3.400	1.270	Open Manhole	1500
1.005	26.562	2656.2	TANK	4.990	3.390	1.000	Open Manhole	1500
2.000	18.632	266.2	S8	5.280	3.525	1.530	Open Manhole	1200
2.001	9.324	233.1	S9	5.285	3.485	1.575	Open Manhole	1200
2.002	33.657	354.3	TANK	4.990	3.390	1.375	Open Manhole	1500
3.000	19.490	389.8	S11	5.125	3.425	1.250	Open Manhole	1350
3.001	30.736	878.2	TANK	4.990	3.390	1.150	Open Manhole	1500
4.000	30.498	321.0	TANK	4.990	3.390	1.300	Open Manhole	1500
5.000	26.182	1745.5	TANK	4.990	3.385	1.305	Open Manhole	1500
1.006	29.145	485.8	S14	4.870	3.330	1.015	Open Manhole	1500
1.007	5.851	390.1	S15	4.980	3.315	1.140	Open Manhole	1500

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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)
1.008	o	525	S15	4.980	3.315	1.140	Open Manhole	1500
1.009	o	525	S16	4.950	3.130	1.295	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.008	61.470	332.3	S16	4.950	3.130	1.295	Open Manhole	1500
1.009	34.390	343.9		4.320	3.030	0.765	Open Manhole	3000

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009		4.320	3.030	0.000	3000	0

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	1
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)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S16, DS/PN: 1.009, Volume (m³): 16.2

Unit Reference	MD-SHE-0397-1015-1000-1015
Design Head (m)	1.000
Design Flow (l/s)	101.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	397
Invert Level (m)	3.130
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	101.4	Kick-Flo®	0.848	93.6
Flush-Flo™	0.554	101.2	Mean Flow over Head Range	-	76.9

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	11.0	1.200	110.8	3.000	173.2	7.000	262.3
0.200	39.1	1.400	119.4	3.500	186.7	7.500	271.4
0.300	75.4	1.600	127.4	4.000	199.4	8.000	280.1
0.400	98.6	1.800	135.0	4.500	211.2	8.500	288.6
0.500	100.9	2.000	142.1	5.000	222.4	9.000	296.8
0.600	101.0	2.200	148.8	5.500	233.0	9.500	304.8
0.800	96.0	2.400	155.3	6.000	243.2		
1.000	101.4	2.600	161.5	6.500	253.0		

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Storage Structures for Storm

Cellular Storage Manhole: TANK , DS/PN: 1.006

Invert Level (m) 3.390 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1245.0	1245.0	0.900	0.0	1359.4
0.800	1245.0	1359.4			

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
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 0.350
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
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+40%	30/15 Summer				4.391
1.001	S2	15 Winter	100	+40%	30/15 Summer				4.366
1.002	S3	15 Winter	100	+40%	30/15 Summer				4.335
1.003	S4	15 Winter	100	+40%	30/15 Summer				4.306
1.004	S5	15 Winter	100	+40%	30/15 Summer				4.266
1.005	S6	15 Winter	100	+40%	30/15 Summer				4.230
2.000	S7	120 Winter	100	+40%	100/15 Summer				4.011
2.001	S8	120 Winter	100	+40%	100/15 Summer				4.009
2.002	S9	120 Winter	100	+40%	100/15 Summer				4.005
3.000	S10	15 Winter	100	+40%	30/15 Summer				4.381
3.001	S11	15 Winter	100	+40%	30/15 Summer				4.297
4.000	S12	120 Winter	100	+40%	100/15 Summer				4.009
5.000	S13	120 Winter	100	+40%	30/15 Summer				4.006
1.006	TANK	120 Winter	100	+40%	100/60 Winter				3.997
1.007	S14	120 Winter	100	+40%	100/30 Winter				4.431
1.008	S15	120 Winter	100	+40%	100/30 Winter				4.659
1.009	S16	120 Winter	100	+40%	100/15 Winter				4.704

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.271	0.000	0.86			138.4	SURCHARGED	
1.001	S2	0.276	0.000	1.02			182.0	SURCHARGED	
1.002	S3	0.275	0.000	1.42			224.7	SURCHARGED	
1.003	S4	0.261	0.000	1.32			234.6	SURCHARGED	
1.004	S5	0.251	0.000	1.59			257.5	SURCHARGED	
1.005	S6	0.230	0.000	3.97			498.1	SURCHARGED	
2.000	S7	0.191	0.000	0.14			4.1	SURCHARGED	
2.001	S8	0.259	0.000	0.33			9.3	SURCHARGED	
2.002	S9	0.295	0.000	0.44			11.4	SURCHARGED	
3.000	S10	0.456	0.000	1.33			174.2	SURCHARGED	
3.001	S11	0.422	0.000	4.24			330.5	SURCHARGED	
4.000	S12	0.224	0.000	0.61			34.3	SURCHARGED	
5.000	S13	0.306	0.000	1.24			27.8	SURCHARGED	
1.006	TANK	0.082	0.000	1.18		145	214.1	SURCHARGED	
1.007	S14	0.576	0.000	1.34			210.9	SURCHARGED	
1.008	S15	0.819	0.000	0.72			173.4	SURCHARGED	
1.009	S16	1.049	0.000	0.51			112.3	FLOOD RISK	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	7.924	0.045	176.1	0.054	6.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	13.414	0.080	167.7	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	11.132	0.045	247.4	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	4.999	0.005	999.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	13.692	0.040	342.3	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.13	3.650	0.054	0.0	0.0	2.9	0.98	39.1	10.2
1.001	50.00	6.36	3.605	0.108	0.0	0.0	5.8	1.01	40.0	20.5
1.002	50.00	6.58	3.525	0.162	0.0	0.0	8.8	0.83	32.9	30.7
1.003	50.00	6.71	3.480	0.162	0.0	0.0	8.8	0.63	100.9	30.7
1.004	50.00	6.92	3.475	0.162	0.0	0.0	8.8	1.09	173.9	30.7

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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	4.895	1.245	Open Manhole	1200	1.000	3.650	225				
S2	5.040	1.435	Open Manhole	1200	1.001	3.605	225	1.000	3.605	225	
S3	4.975	1.450	Open Manhole	1200	1.002	3.525	225	1.001	3.525	225	
TANK	4.760	1.280	Open Manhole	100	1.003	3.480	450	1.002	3.480	225	
S4	5.080	1.605	Open Manhole	1350	1.004	3.475	450	1.003	3.475	450	
	5.090	1.655	Open Manhole	0		OUTFALL		1.004	3.435	450	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	471349.019	105577.328	471349.019	105577.328	Required	
S2	471342.228	105581.413	471342.228	105581.413	Required	
S3	471342.740	105594.817	471342.740	105594.817	Required	
TANK	471342.492	105605.946	471342.492	105605.946	Required	
S4	471342.684	105610.941	471342.684	105610.941	Required	
	471353.388	105619.479			No Entry	

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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)
1.000	o	225	S1	4.895	3.650	1.020	Open Manhole	1200
1.001	o	225	S2	5.040	3.605	1.210	Open Manhole	1200
1.002	o	225	S3	4.975	3.525	1.225	Open Manhole	1200
1.003	o	450	TANK	4.760	3.480	0.830	Open Manhole	100
1.004	o	450	S4	5.080	3.475	1.155	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	7.924	176.1	S2	5.040	3.605	1.210	Open Manhole	1200
1.001	13.414	167.7	S3	4.975	3.525	1.225	Open Manhole	1200
1.002	11.132	247.4	TANK	4.760	3.480	1.055	Open Manhole	100
1.003	4.999	999.8	S4	5.080	3.475	1.155	Open Manhole	1350
1.004	13.692	342.3		5.090	3.435	1.205	Open Manhole	0

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	1
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)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S4, DS/PN: 1.004, Volume (m³): 3.0

Unit Reference	MD-SHE-0098-3800-0600-3800
Design Head (m)	0.600
Design Flow (l/s)	3.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	3.475
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	3.8	Kick-Flo®	0.419	3.2
Flush-Flo™	0.185	3.8	Mean Flow over Head Range	-	3.2

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	3.2	1.200	5.2	3.000	8.0	7.000	12.0
0.200	3.8	1.400	5.6	3.500	8.7	7.500	12.5
0.300	3.7	1.600	6.0	4.000	9.2	8.000	12.9
0.400	3.4	1.800	6.3	4.500	9.8	8.500	13.3
0.500	3.5	2.000	6.6	5.000	10.3	9.000	13.7
0.600	3.8	2.200	7.0	5.500	10.7	9.500	14.0
0.800	4.3	2.400	7.2	6.000	11.2		
1.000	4.8	2.600	7.5	6.500	11.6		

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Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 1.003

Invert Level (m) 3.440 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	155.4	155.4	0.500	0.0	178.1
0.400	155.4	178.1			

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
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 0.350
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
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	240 Winter	100	+40%	30/15 Summer				4.592
1.001	S2	240 Winter	100	+40%	30/15 Summer				4.590
1.002	S3	240 Winter	100	+40%	30/15 Summer				4.585
1.003	TANK	240 Winter	100	+40%	100/120 Winter				4.578
1.004	S4	240 Winter	100	+40%	100/120 Winter				4.577

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.717	0.000	0.21			6.3	SURCHARGED	
1.001	S2	0.760	0.000	0.36			12.6	SURCHARGED	
1.002	S3	0.835	0.000	0.68			18.9	SURCHARGED	
1.003	TANK	0.648	0.000	0.05		223	6.3	FLOOD RISK	
1.004	S4	0.652	0.000	0.04			5.0	SURCHARGED	

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Net Internal Areas of Existing Buildings Have Been Taken From Plowman Craven, Area Measurement Report

BUILDING	FLOOR	TYPE	AREA
B1000	FIRST	ACCOMODATION	54.3
B1000	GROUND	ACCOMODATION	122.6
B1000	FIRST	ANCILLARY	13.4
B1000	FIRST	LABORATORY	1029.5
B1000	FIRST	OFFICE	12777.2
B1000	FIRST	STORAGE	733.1
B1000	GROUND	STORAGE	623.1
B4000	GROUND	ACCOMODATION	168.2
B4000	FIRST	ANCILLARY	1318.7
B4000	GROUND	ANCILLARY	297.5
B4000	FIRST	LABORATORY	431.4
B4000	FIRST	OFFICE	674.6
B4000	GROUND	OFFICE	425.8
B4000	FIRST	STOARGE	5.7
B4000	GROUND	STORAGE	243.8
B5000	FIRST	ANCILLARY	14.5
B5000	MEZZANINE	OFFICE	1469.6
B5000	FIRST	OFFICE	5854.2
B5000	GROUND	OFFICE	100.8
B5000	FIRST	STORAGE	1285.3
B5000	GROUND	STORAGE	392.6
B6000	SECOND	ANCILLARY	39.2
B6000	GROUND	ANCILLARY	20.7
B6000	SECOND	OFFICE	4165.5
B6000	FIRST	OFFICE	4117.8
B6000	GROUND	OFFICE	3367.2
B6000	SECOND	STORAGE	54.1
B6000	FIRST	STORAGE	54.6
B6000	GROUND	STORAGE	67.7
B7000	SECOND	ANCILLARY	5.1
B7000	FIRST	LABORATORY	364.3
B7000	SECOND	OFFICE	1859
B7000	FIRST	OFFICE	1766.1
B7000	GROUND	STORAGE	955.8
GYM	GROUND		334.4
NURSERY	GROUND		263.6

Existing Buildings

	INTERNAL AREAS (NIA)			EXISTING FOUL FLOWS			
		m^2	ha	l/m2/day	l/day (DWF)	Peak flow 6 x DWF + 10%	Peak Flow l/s
B1000	ACCOMADATION	176.9	0.018	11.25	1990.1	13135	0.152
	ANCILLARY	13.4	0.001	3	40.2	265	0.003
	LABORATORY	1029.5	0.103	7.5	7721.3	50960	0.590
	OFFICE	12777.2	1.278	7.5	95829.0	632471	7.320
	STORAGE	1356.2	0.136	1.5	2034.3	13426	0.155
		15353.2	**1.535**				
B4000	ACCOMADATION	168.2	0.017	11.25	1892.3	12489	0.145
	ANCILLARY	1616.2	0.162	3	4848.6	32001	0.370
	LABORATORY	431.4	0.043	7.5	3235.5	21354	0.247
	OFFICE	1100.4	0.110	7.5	8253.0	54470	0.630
	STORAGE	249.5	0.025	1.5	374.3	2470	0.029
		3565.7	**0.357**				
B5000	ANCILLARY	14.5	0.001	3	43.5	287	0.003
	OFFICE	7424.6	0.742	7.5	55684.5	367518	4.254
	STORAGE	1677.9	0.168	1.5	2516.9	16611	0.192
		9117.0	**0.912**				
B6000	ANCILLARY	59.9	0.006	3	179.7	1186	0.014
	OFFICE	11650.5	1.165	7.5	87378.8	576700	6.675
	STORAGE	176.4	0.018	1.5	264.6	1746	0.020
		11886.8	**1.189**				
B7000	ANCILLARY	5.1	0.001	3	15.3	101	0.001
	LABORATORY	364.3	0.036	7.5	2732.3	18033	0.209
	OFFICE	3625.1	0.363	7.5	27188.3	179442	2.077
	STORAGE	955.8	0.096	1.5	1433.7	9462	0.110
		4950.3	**0.495**				
GYM (GIA)		334.4	0.033	1.5	501.6	3311	0.038
NURSERY (GIA)		263.6	0.026	1.5	395.4	2610	0.030
	TOTAL AREA	45471.0	4.547			TOTAL FLOW	23.3

l/m2/day has been based on the below

	Suggested dry weather flow rates - Litres
HOTEL	550 per room
COMMERCIAL PREMISES	300 per $100m^2$
OFFICES	750 per $100m^2$
WAREHOUSE	150 per $100m^2$

Phase 1

EXPECTED REDUCTION IN FOUL FLOW DUE TO DEMOLITION (B1000 & GYM DEMOLITION WORKS)			
B1000	Total Area	15353	
	Flow l/s	8.221	
	Area Demolised	5904.4 (38%)	
	Adjusted Flow l/s (38% reduction)		3.161
Gym	Flow l/s		0.038
TOTAL FLOW REDUCTION (l/s)			**3.200**

NIA: Net Internal Area

B1000 Demolished area is an approximate figure only and has been taken from Plowman Craven Area Measurement Report (Sum of NIA of loading bay 1 and 2

EXPECTED ADDITION IN FOUL FLOW DUE TO PLOT 1 DEVELOPMENT					
	INTERNAL AREAS (GIA)		FOUL FLOWS		
Building	m^2	l/m^2/day (Office/Commercial)	DWF l/day	Peak Flow 6 x DWF + 10%	Peak Flow l/s
1 (Office)	337.350	1.5	506.025	3339.8	0.039
1 (Commercial)	1911.650	3	5734.950	37850.7	0.438
2 (Office)	278.850	1.5	418.275	2760.6	0.032
2 (Commercial)	1580.150	3	4740.450	31287.0	0.362
3 (Office)	542.700	1.5	814.050	5372.7	0.062
3 (Commercial)	3075.300	3	9225.900	60890.9	0.705
4 (Office)	475.500	1.5	713.250	4707.5	0.054
4 (Commercial)	2694.500	3	8083.500	53351.1	0.617
TOTAL AREA	10896.000			TOTAL FLOW	2.310

EXPECTED OVERALL REDUCTION IN FOUL FLOW		
BUILDING	TOTAL AREA (m^2)	PEAK FLOW (l/s)
B1000 & Gym	6238.8	3.200
Plot 1	10896.0	2.310
TOTAL REDUCTION IN FOUL FLOW		0.890

Appendix D – Other Supporting Information

E.1 Clancy Flood Risk Assessment (FRA) and SUDS Strategy, 02/07/2019 (Report Reference 8/1982)

E.2 Delta Simons Phase 1 Environmental Assessment, Nov 2020 (Report Reference 15-0754.07)

E.3 Clancy Consulting Geo-Environmental Appraisal Report, Oct 2029 (Report Reference 10/1425/001).