CROUCH WATERFALL	Butlins Bognor Temp Venue Surface Water Network	Micro Drainage
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Innovyze	Network 2020.1	

Existing Network Details 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
S1.000	44.111	0.292	151.1	0.158	15.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	6.426	0.043	149.4	0.052	0.00	0.0	0.600	o	150	Pipe/Conduit
S1.002	16.723	0.111	150.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.000	28.472	0.190	149.9	0.072	15.00	0.0	0.600	o	150	Pipe/Conduit
S3.000	24.172	0.240	100.7	0.068	15.00	0.0	0.600	o	150	Pipe/Conduit
S2.001	4.579	0.031	147.7	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.002	4.579	0.031	147.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.003	3.395	0.023	147.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	1.335	0.158	0.0	0.82	14.4
S1.001	1.043	0.210	0.0	0.82	14.5
S1.002	1.000	0.210	0.0	0.82	14.4
S2.000	1.325	0.072	0.0	0.82	14.5
S3.000	1.375	0.068	0.0	1.00	17.7
S2.001	1.135	0.150	0.0	0.82	14.6
S2.002	1.104	0.150	0.0	0.82	14.6
S2.003	1.073	0.150	0.0	0.82	14.6

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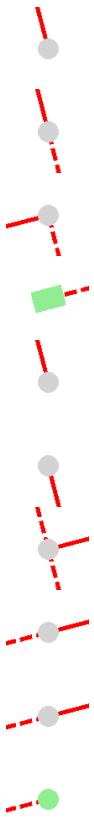
Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	2.350	1.015	Open Manhole	600	S1.000	1.335	150				
STANK1	2.050	1.007	Open Manhole	200	S1.001	1.043	150	S1.000	1.043	150	
S2FC	2.050	1.050	Open Manhole	1200	S1.002	1.000	150	S1.001	1.000	150	
SWEST	2.130	1.241	Open Manhole	900 x 600		OUTFALL		S1.002	0.889	150	
S3	2.350	1.025	Open Manhole	600	S2.000	1.325	150				
S7	2.050	0.675	Open Manhole	600	S3.000	1.375	150				
S8	2.050	0.915	Open Manhole	600	S2.001	1.135	150	S2.000	1.135	150	
								S3.000	1.135	150	
STANK2	2.050	0.946	Open Manhole	200	S2.002	1.104	150	S2.001	1.104	150	
S6FC	2.050	0.977	Open Manhole	1200	S2.003	1.073	150	S2.002	1.073	150	
SEAST	2.050	1.000	Open Manhole	600		OUTFALL		S2.003	1.050	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	494269.699	99109.727	494269.699	99109.727	Required	
STANK1	494258.548	99152.406	494258.548	99152.406	Required	
S2FC	494256.923	99158.623	494256.923	99158.623	Required	
SWEST	494240.743	99154.396			No Entry	
S3	494310.918	99120.498	494310.918	99120.498	Required	
S7	494297.609	99171.431	494297.609	99171.431	Required	
S8	494303.719	99148.045	494303.719	99148.045	Required	
STANK2	494308.149	99149.202	494308.149	99149.202	Required	
S6FC	494312.579	99150.360	494312.579	99150.360	Required	
SEAST	494315.865	99151.218			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)
S1.000	o	150	S1	2.350	1.335	0.865	Open Manhole	600
S1.001	o	150	STANK1	2.050	1.043	0.857	Open Manhole	200
S1.002	o	150	S2FC	2.050	1.000	0.900	Open Manhole	1200
S2.000	o	150	S3	2.350	1.325	0.875	Open Manhole	600
S3.000	o	150	S7	2.050	1.375	0.525	Open Manhole	600
S2.001	o	150	S8	2.050	1.135	0.765	Open Manhole	600
S2.002	o	150	STANK2	2.050	1.104	0.796	Open Manhole	200
S2.003	o	150	S6FC	2.050	1.073	0.827	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)
S1.000	44.111	151.1	STANK1	2.050	1.043	0.857	Open Manhole	200
S1.001	6.426	149.4	S2FC	2.050	1.000	0.900	Open Manhole	1200
S1.002	16.723	150.7	SWEST	2.130	0.889	1.091	Open Manhole	900 x 600
S2.000	28.472	149.9	S8	2.050	1.135	0.765	Open Manhole	600
S3.000	24.172	100.7	S8	2.050	1.135	0.765	Open Manhole	600
S2.001	4.579	147.7	STANK2	2.050	1.104	0.796	Open Manhole	200
S2.002	4.579	147.7	S6FC	2.050	1.073	0.827	Open Manhole	1200
S2.003	3.395	147.6	SEAST	2.050	1.050	0.850	Open Manhole	600

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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	-	-	100	0.158	0.158	0.158
1.001	-	-	100	0.052	0.052	0.052
1.002	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.072	0.072	0.072
3.000	-	-	100	0.068	0.068	0.068
2.001	-	-	100	0.010	0.010	0.010
2.002	-	-	100	0.000	0.000	0.000
2.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.360	0.360	0.360

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S1.000	S1	150	0.857	0.865	Unclassified	600	0	0.865	Unclassified
S1.001	STANK1	150	0.857	0.900	Unclassified	200	0	0.857	Unclassified
S1.002	S2FC	150	0.900	1.091	Unclassified	1200	0	0.900	Unclassified
S2.000	S3	150	0.765	0.875	Unclassified	600	0	0.875	Unclassified
S3.000	S7	150	0.525	0.765	Unclassified	600	0	0.525	Unclassified
S2.001	S8	150	0.765	0.796	Unclassified	600	0	0.765	Unclassified
S2.002	STANK2	150	0.796	0.827	Unclassified	200	0	0.796	Unclassified
S2.003	S6FC	150	0.827	0.850	Unclassified	1200	0	0.827	Unclassified

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)
S1.002	SWEST	2.130	0.889	0.000	900	600

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)
S2.003	SEAST	2.050	1.050	0.000	600	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 Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	10	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: S2FC, DS/PN: S1.002, Volume (m³): 1.3

Unit Reference	MD-SHE-0101-6000-2000-6000
Design Head (m)	2.000
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	101
Invert Level (m)	1.000
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)	2.000	6.0	Kick-Flo®	0.900	4.1
Flush-Flo™	0.438	5.2	Mean Flow over Head Range	-	4.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.800	4.7	2.000	6.0	4.000	8.3	7.000	10.8
0.200	4.7	1.000	4.3	2.200	6.3	4.500	8.8	7.500	11.2
0.300	5.1	1.200	4.7	2.400	6.5	5.000	9.2	8.000	11.5
0.400	5.2	1.400	5.1	2.600	6.8	5.500	9.7	8.500	11.9
0.500	5.2	1.600	5.4	3.000	7.3	6.000	10.1	9.000	12.2
0.600	5.1	1.800	5.7	3.500	7.8	6.500	10.5	9.500	12.5

Hydro-Brake® Optimum Manhole: S6FC, DS/PN: S2.003, Volume (m³): 1.2

Unit Reference	MD-SHE-0107-5000-0900-5000
Design Head (m)	0.900
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	107
Invert Level (m)	1.073
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)	0.900	5.0	Kick-Flo®	0.590	4.1
Flush-Flo™	0.271	5.0	Mean Flow over Head Range	-	4.3

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	3.6	0.300	5.0	0.500	4.6	0.800	4.7	1.200	5.7
0.200	4.9	0.400	4.9	0.600	4.1	1.000	5.2	1.400	6.1

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Hydro-Brake® Optimum Manhole: S6FC, DS/PN: S2.003, Volume (m³): 1.2

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)
1.600	6.5	2.400	7.9	4.000	10.1	6.000	12.2	8.000	14.0
1.800	6.9	2.600	8.2	4.500	10.6	6.500	12.7	8.500	14.4
2.000	7.2	3.000	8.8	5.000	11.2	7.000	13.1	9.000	14.8
2.200	7.6	3.500	9.4	5.500	11.7	7.500	13.6	9.500	15.2

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Storage Structures for Storm

Cellular Storage Manhole: STANK1, DS/PN: S1.001

Invert Level (m) 1.043 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)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	45.0	0.0	0.500	45.0	0.0	0.501	0.0	0.0

Cellular Storage Manhole: STANK2, DS/PN: S2.002

Invert Level (m) 1.104 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)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.0	0.0	0.500	24.0	0.0	0.501	0.0	0.0

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10 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 Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 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 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 10
Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	30 Winter	10	+0%	10/15 Summer				1.901	0.416	0.000
S1.001	STANK1	60 Winter	10	+0%	10/15 Summer				1.861	0.668	0.000
S1.002	S2FC	60 Winter	10	+0%	10/15 Summer				1.849	0.699	0.000
S2.000	S3	60 Winter	10	+0%	10/15 Summer				1.872	0.397	0.000
S3.000	S7	60 Winter	10	+0%	10/15 Winter				1.869	0.344	0.000
S2.001	S8	60 Winter	10	+0%	10/15 Summer				1.863	0.578	0.000
S2.002	STANK2	60 Winter	10	+0%	10/15 Summer				1.861	0.607	0.000
S2.003	S6FC	60 Winter	10	+0%	10/15 Summer				1.858	0.635	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	1.32			18.5	SURCHARGED	
S1.001	STANK1	0.54		58	6.6	FLOOD RISK	
S1.002	S2FC	0.39			5.2	FLOOD RISK	
S2.000	S3	0.53			7.3	SURCHARGED	
S3.000	S7	0.42			7.0	FLOOD RISK	
S2.001	S8	1.29			14.3	FLOOD RISK	
S2.002	STANK2	0.49		44	5.4	FLOOD RISK	
S2.003	S6FC	0.46			5.0	FLOOD RISK	

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