Appendix C Hydraulic Modelling Calculations

HQ Building

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	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	20.000	Volumetric Runoff Coeff.	1.000	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.400	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	120	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Time Area Diagram for Storm at outfall (pipe 1.017)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.461	4-8	0.238

Total Area Contributing (ha) = 0.699

Total Pipe Volume (m³) = 37.402

Time Area Diagram at outfall (pipe 21.002)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.562	4-8	0.061

Total Area Contributing (ha) = 0.623

Total Pipe Volume (m³) = 3.405

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.028	0.028	0.028
2.000	-	-	100	0.007	0.007	0.007
3.000	-	-	100	0.008	0.008	0.008
1.001	-	-	100	0.028	0.028	0.028
4.000	-	-	100	0.007	0.007	0.007
4.001	-	-	100	0.000	0.000	0.000
4.002	-	-	100	0.006	0.006	0.006
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.019	0.019	0.019
5.001	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.058	0.058	0.058
1.005	-	-	100	0.000	0.000	0.000
6.000	-	-	100	0.023	0.023	0.023
6.001	-	-	100	0.017	0.017	0.017
1.006	-	-	100	0.004	0.004	0.004
1.007	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.056	0.056	0.056
7.001	-	-	100	0.000	0.000	0.000
8.000	-	-	100	0.013	0.013	0.013
1.008	-	-	100	0.018	0.018	0.018
1.009	-	-	100	0.009	0.009	0.009
9.000	-	-	100	0.035	0.035	0.035
9.001	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.006	0.006	0.006
10.000	-	-	100	0.017	0.017	0.017
1.011	-	-	100	0.017	0.017	0.017
1.012	-	-	100	0.030	0.030	0.030
11.000	-	-	100	0.014	0.014	0.014
11.001	-	-	100	0.023	0.023	0.023
12.000	-	-	100	0.024	0.024	0.024
13.000	-	-	100	0.008	0.008	0.008
14.000	-	-	100	0.006	0.006	0.006
15.000	-	-	100	0.007	0.007	0.007

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
12.001	-	-	100	0.019	0.019	0.019
16.000	-	-	100	0.018	0.018	0.018
12.002	-	-	100	0.000	0.000	0.000
17.000	-	-	100	0.006	0.006	0.006
18.000	-	-	100	0.042	0.042	0.042
18.001	-	-	100	0.024	0.024	0.024
19.000	-	-	100	0.019	0.019	0.019
18.002	-	-	100	0.000	0.000	0.000
20.000	-	-	100	0.007	0.007	0.007
20.001	-	-	100	0.000	0.000	0.000
18.003	-	-	100	0.000	0.000	0.000
11.002	-	-	100	0.019	0.019	0.019
11.003	-	-	100	0.006	0.006	0.006
11.004	-	-	100	0.022	0.022	0.022
1.013	-	-	100	0.000	0.000	0.000
1.014	-	-	100	0.029	0.029	0.029
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
1.017	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.699	0.699	0.699

Online Controls for Storm

Orifice Manhole: 6, DS/PN: 1.001, Volume (m³): 0.8

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 77.650

Orifice Manhole: 2, DS/PN: 4.001, Volume (m³): 0.2

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 77.704

Orifice Manhole: RG03, DS/PN: 7.001, Volume (m³): 0.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 74.250

Orifice Manhole: 21, DS/PN: 9.001, Volume (m³): 1.4

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 74.028

Orifice Manhole: RG05, DS/PN: 12.001, Volume (m³): 0.8

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 77.950

Orifice Manhole: 44, DS/PN: 20.001, Volume (m³): 1.4

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 77.542

Hydro-Brake® Optimum Manhole: 19, DS/PN: 1.016, Volume (m³): 12.5

Unit Reference	MD-SHE-0064-2500-1950-2500	Application	Surface
Design Head (m)	1.950	Sump Available	Yes
Design Flow (l/s)	2.5	Diameter (mm)	64
Flush-Flo™	Calculated	Invert Level (m)	71.250
Objective	Minimise upstream storage	Minimum Outlet Pipe Diameter (mm)	100

Hydro-Brake® Optimum Manhole: 19, DS/PN: 1.016, Volume (m³): 12.5

Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.950	2.5	Kick-Flo®	0.576	1.4
Flush-Flo™	0.281	1.8	Mean Flow over Head Range	-	1.9

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.600	1.5	1.600	2.3	2.600	2.8	5.000	3.9	7.500	4.7
0.200	1.7	0.800	1.7	1.800	2.4	3.000	3.0	5.500	4.0	8.000	4.8
0.300	1.8	1.000	1.8	2.000	2.5	3.500	3.3	6.000	4.2	8.500	5.0
0.400	1.7	1.200	2.0	2.200	2.6	4.000	3.5	6.500	4.4	9.000	5.1
0.500	1.6	1.400	2.1	2.400	2.7	4.500	3.7	7.000	4.5	9.500	5.2

Storage Structures for Storm

Complex Manhole: 6, DS/PN: 1.001

Cellular Storage

Invert Level (m) 77.650 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.400	40.0	0.0	0.401	0.0	0.0

Bio-Retention Area

Invert Level (m) 78.050 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.300	40.0	38.000	0.301	0.0	38.000

Tank or Pond

Invert Level (m) 78.350

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	0.150	40.0	0.151	0.0

Bio-Retention Area Manhole: RG01, DS/PN: 4.000

Invert Level (m) 77.750 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Bio-Retention Area Manhole: RG01, DS/PN: 4.000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.400	40.0	38.000	0.401	0.0	38.000

Complex Manhole: RG02, DS/PN: 1.004

Cellular Storage

Invert Level (m) 76.951 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.800	40.0	0.0	0.801	0.0	0.0

Bio-Retention Area

Invert Level (m) 77.751 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.300	40.0	38.000	0.301	0.0	38.000

Tank or Pond

Invert Level (m) 78.051

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	0.150	40.0	0.151	0.0

Complex Manhole: RG03, DS/PN: 7.001

Cellular Storage

Invert Level (m) 74.250 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.400	40.0	0.0	0.401	0.0	0.0

Bio-Retention Area

Invert Level (m) 74.650 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.300	40.0	38.000	0.301	0.0	38.000

Tank or Pond

Invert Level (m) 74.950

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	0.250	40.0	0.251	0.0

Complex Manhole: 16, DS/PN: 9.000

Cellular Storage

Invert Level (m) 74.250 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Cellular Storage

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.400	40.0	0.0	0.401	0.0	0.0

Bio-Retention Area

Invert Level (m) 74.650 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.300	40.0	38.000	0.301	0.0	38.000

Tank or Pond

Invert Level (m) 74.950

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	0.150	40.0	0.151	0.0

Complex Manhole: SW22, DS/PN: 11.001

Cellular Storage

Invert Level (m) 77.900 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.399	40.0	0.0	0.400	0.0	0.0

Bio-Retention Area

Invert Level (m) 78.700 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.40 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.499	40.0	38.000	0.500	0.0	38.000

Tank or Pond

Invert Level (m) 78.850

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	0.050	40.0	0.051	0.0

Complex Manhole: RG05, DS/PN: 12.001

Cellular Storage

Invert Level (m) 77.950 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.400	40.0	0.0	0.401	0.0	0.0

Bio-Retention Area

Invert Level (m) 78.350 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Bio-Retention Area

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	40.0	38.000	0.300	40.0	38.000	0.301	0.0	38.000

Tank or Pond

Invert Level (m) 78.650

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	0.150	40.0	0.151	0.0

Complex Manhole: RG04, DS/PN: 19.000

Cellular Storage

Invert Level (m) 78.000 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	22.0	0.0	0.400	22.0	0.0	0.401	0.0	0.0

Bio-Retention Area

Invert Level (m) 78.400 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)	Depth (m)	Area (m²)	Perimeter (m)
0.000	22.0	20.000	0.300	22.0	20.000	0.301	0.0	20.000

Tank or Pond

Invert Level (m) 78.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	20.0	0.150	20.0	0.151	0.0

Porous Car Park Manhole: 43, DS/PN: 20.000

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	85.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	77.650	Depression Storage (mm)	5
Max Percolation (l/s)	19.4	Width (m)	7.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	10.0	Cap Volume Depth (m)	0.350

Tank or Pond Manhole: 19, DS/PN: 1.016

Invert Level (m) 71.250

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	1.949	600.5	1.950	0.0

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	12	Number of Storage Structures	15	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SW01	60 minute 1 year Summer I+0%	60	79.000	77.994	-0.106	0.000	0.18	0.006	3.314	0.8		3.4	OK
2.000	SW03	60 minute 1 year Summer I+0%	60	79.000	77.968	-0.132	0.000	0.03	0.002	0.829	0.7		0.9	OK
3.000	SW02	60 minute 1 year Summer I+0%	60	79.000	77.971	-0.129	0.000	0.05	0.003	0.947	0.7		1.0	OK
1.001	6	60 minute 1 year Summer I+0%	60	78.600	77.756	-0.044	0.000	0.21	4.050	7.763	0.9	28	4.1	OK
4.000	RG01	60 minute 1 year Summer I+0%	60	78.600	77.771	-0.129	0.000	0.05	0.254	0.828	0.4	18	0.6	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
4.001	2	60 minute 1 year Summer I+0%	60	78.800	77.743	-0.111	0.000	0.05	0.019	0.828	0.5		0.6	OK
4.002	SW04	60 minute 1 year Summer I+0%	60	79.000	77.682	-0.126	0.000	0.06	0.010	1.538	0.7		1.2	OK
1.002	SW05	60 minute 1 year Summer I+0%	60	78.600	77.476	-0.174	0.000	0.12	0.014	9.299	0.8		5.2	OK
1.003	SW06	60 minute 1 year Summer I+0%	60	78.600	77.354	-0.183	0.000	0.08	0.036	9.297	1.0		5.2	OK
5.000	SW26	60 minute 1 year Summer I+0%	60	78.900	77.897	-0.103	0.000	0.21	0.007	2.249	0.5		2.3	OK
5.001	SW27	60 minute 1 year Summer I+0%	60	78.900	77.849	-0.124	0.000	0.07	0.009	2.249	1.1		2.3	OK
1.004	RG02	60 minute 1 year Summer I+0%	60	78.600	77.112	0.011	0.000	1.00	6.193	17.498	0.4	30	6.8	SURCHARGED
1.005	SW07	60 minute 1 year Summer I+0%	60	78.000	76.994	-0.106	0.000	0.19	0.040	17.492	1.6		6.8	OK
6.000	14	60 minute 1 year Summer I+0%	60	78.150	76.842	-0.108	0.000	0.17	0.042	2.722	0.7		2.8	OK
6.001	15	60 minute 1 year Summer I+0%	60	77.800	76.509	-0.091	0.000	0.33	0.093	4.734	0.7		4.4	OK
1.006	SW08	60 minute 1 year Summer I+0%	60	78.000	76.429	-0.109	0.000	0.17	0.034	22.693	2.8		11.0	OK
1.007	SW09	60 minute 1 year Summer I+0%	60	75.200	74.086	-0.214	0.000	0.18	0.091	22.685	0.7		11.0	OK
7.000	15	60 minute 1 year Summer I+0%	60	75.200	74.371	-0.154	0.000	0.22	0.011	6.627	0.6		6.8	OK
7.001	RG03	60 minute 1 year Summer I+0%	60	75.200	74.346	-0.129	0.000	0.04	3.708	5.895	1.2	34	2.6	OK
8.000	SW28	60 minute 1 year Summer I+0%	60	75.200	74.180	-0.120	0.000	0.09	0.004	1.539	0.7		1.6	OK
1.008	SW10	60 minute 1 year Summer I+0%	60	75.200	74.055	-0.207	0.000	0.21	0.087	32.231	0.9		16.1	OK
1.009	SW11	60 minute 1 year Summer I+0%	60	75.200	73.910	-0.200	0.000	0.24	0.160	33.279	0.8		16.9	OK
9.000	16	60 minute 1 year Summer I+0%	60	75.200	74.287	-0.113	0.000	0.14	0.452	4.142	1.2	12	4.1	OK
9.001	21	60 minute 1 year Summer I+0%	60	75.200	74.179	0.001	0.000	0.13	0.185	4.142	1.5		4.0	SURCHARGED
1.010	SW12	60 minute 1 year Summer I+0%	60	75.200	73.836	-0.196	0.000	0.26	0.161	38.116	1.0		21.1	OK
10.000	SW13	60 minute 1 year Summer I+0%	60	75.200	74.177	-0.123	0.000	0.07	0.003	2.012	1.0		2.1	OK
1.011	SW14	60 minute 1 year Summer I+0%	60	75.200	73.747	-0.180	0.000	0.34	0.172	42.125	0.9		24.1	OK
1.012	SW15	60 minute 1 year Summer I+0%	60	75.200	73.685	-0.160	0.000	0.44	0.252	45.655	0.8		27.1	OK
11.000	SW23	60 minute 1 year Summer I+0%	60	78.850	78.121	-0.119	0.000	0.09	0.004	1.657	0.7		1.7	OK
11.001	SW22	60 minute 1 year Summer I+0%	60	78.850	77.934	-0.116	0.000	0.12	0.427	4.379	1.3	14	3.9	OK
12.000	SW27	60 minute 1 year Summer I+0%	60	79.000	78.139	-0.111	0.000	0.15	0.005	2.840	0.8		2.9	OK
13.000	SW30	60 minute 1 year Summer I+0%	60	79.000	78.122	-0.128	0.000	0.05	0.003	0.947	0.6		1.0	OK
14.000	SW31	60 minute 1 year Summer I+0%	60	79.000	78.118	-0.132	0.000	0.03	0.002	0.710	0.6		0.7	OK
15.000	SW32	60 minute 1 year Summer I+0%	60	79.000	78.131	-0.119	0.000	0.09	0.004	0.828	0.3		0.9	OK
12.001	RG05	60 minute 1 year Summer I+0%	60	79.000	78.047	-0.053	0.000	0.10	3.804	6.931	1.4	29	3.6	OK
16.000	SW29	60 minute 1 year Summer I+0%	60	79.000	77.978	-0.122	0.000	0.08	0.004	2.131	1.0		2.2	OK
12.002	SW28	60 minute 1 year Summer I+0%	60	79.000	77.657	-0.104	0.000	0.20	0.016	9.058	1.0		4.7	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
17.000	SW33	60 minute 1 year Summer I+0%	60	79.000	77.889	-0.137	0.000	0.02	0.001	0.710	1.2		0.7	OK
18.000	SW18	60 minute 1 year Summer I+0%	60	79.000	77.930	-0.170	0.000	0.13	0.014	4.970	0.7		5.0	OK
18.001	SW19	60 minute 1 year Summer I+0%	60	79.000	77.745	-0.157	0.000	0.20	0.092	7.811	0.7		7.4	OK
19.000	RG04	60 minute 1 year Summer I+0%	60	78.850	77.925	-0.125	0.000	0.07	0.003	2.249	1.2	9	2.3	OK
18.002	SW20	60 minute 1 year Summer I+0%	60	78.850	77.640	-0.132	0.000	0.36	0.132	10.060	0.6		9.6	OK
20.000	43	60 minute 1 year Summer I+0%	60	78.700	77.671	-0.079	0.000	0.09	0.056	0.479	0.6	14	0.7	OK
20.001	44	120 minute 1 year Summer I+0%	120	78.775	77.668	0.026	0.000	0.04	0.154	0.673	0.5		0.3	SURCHARGED
18.003	SW21	60 minute 1 year Summer I+0%	60	78.850	77.433	-0.151	0.000	0.24	0.020	10.537	0.9		9.7	OK
11.002	SW24	60 minute 1 year Summer I+0%	60	78.100	77.196	-0.173	0.000	0.12	0.073	26.931	3.0		20.8	OK
11.003	SW25	60 minute 1 year Summer I+0%	60	76.421	75.363	-0.158	0.000	0.19	0.013	27.640	2.2		21.4	OK
11.004	SW26	60 minute 1 year Summer I+0%	60	75.200	74.142	-0.151	0.000	0.24	0.088	30.240	2.1		23.7	OK
1.013	SW16	60 minute 1 year Summer I+0%	60	75.200	73.506	-0.282	0.000	0.30	0.252	75.881	0.9		50.4	OK
1.014	SW17	60 minute 1 year Summer I+0%	60	75.200	73.256	-0.293	0.000	0.26	0.051	79.303	1.1		53.2	OK
1.015	60	60 minute 1 year Summer I+0%	60	75.020	73.067	-0.353	0.000	0.10	0.222	79.287	2.1		53.3	OK
1.016	19	960 minute 1 year Summer I+0%	960	73.200	71.745	-0.030	0.000	0.01	120.731	191.075	0.0		1.8	OK
1.017	21	480 minute 1 year Summer I+0%	480	73.345	71.217	-0.658	0.000	0.00	0.043	152.305	0.2		1.8	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s) Summer and Winter
Duration(s) (mins) 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SW01	60 minute 30 year Summer I+0%	60	79.000	78.030	-0.070	0.000	0.55	0.012	9.854	1.1		10.2	OK
2.000	SW03	60 minute 30 year Summer I+0%	60	79.000	77.982	-0.118	0.000	0.10	0.004	2.464	0.9		2.6	OK
3.000	SW02	60 minute 30 year Summer I+0%	60	79.000	77.988	-0.112	0.000	0.14	0.005	2.816	0.9		2.9	OK
1.001	6	60 minute 30 year Summer I+0%	60	78.600	77.943	0.143	0.000	0.53	11.506	24.193	1.2	22	10.3	SURCHARGED
4.000	RG01	60 minute 30 year Summer I+0%	60	78.600	77.794	-0.106	0.000	0.15	0.535	2.463	0.5	12	2.0	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
4.001	2	60 minute 30 year Summer I+0%	60	78.800	77.784	-0.070	0.000	0.15	0.041	2.462	0.7		2.0	OK
4.002	SW04	60 minute 30 year Summer I+0%	60	79.000	77.703	-0.105	0.000	0.19	0.021	4.574	0.9		4.0	OK
1.002	SW05	60 minute 30 year Summer I+0%	60	78.600	77.510	-0.140	0.000	0.31	0.025	28.763	1.0		13.5	OK
1.003	SW06	60 minute 30 year Summer I+0%	60	78.600	77.382	-0.155	0.000	0.21	0.062	28.760	1.3		13.5	OK
5.000	SW26	60 minute 30 year Summer I+0%	60	78.900	77.938	-0.062	0.000	0.64	0.013	6.686	0.7		6.9	OK
5.001	SW27	60 minute 30 year Summer I+0%	60	78.900	77.870	-0.103	0.000	0.21	0.017	6.686	1.5		6.8	OK
1.004	RG02	60 minute 30 year Summer I+0%	60	78.600	77.316	0.215	0.000	3.78	14.171	54.748	1.5	26	25.9	SURCHARGED
1.005	SW07	60 minute 30 year Summer I+0%	60	78.000	77.043	-0.057	0.000	0.71	0.090	54.738	2.2		25.9	OK
6.000	14	60 minute 30 year Summer I+0%	60	78.150	76.877	-0.073	0.000	0.50	0.082	8.094	0.9		8.2	OK
6.001	15	60 minute 30 year Summer I+0%	60	77.800	76.579	-0.021	0.000	1.00	0.245	14.076	0.9		13.6	OK
1.006	SW08	60 minute 30 year Summer I+0%	60	78.000	76.470	-0.068	0.000	0.58	0.072	70.214	3.8		37.7	OK
1.007	SW09	60 minute 30 year Summer I+0%	60	75.200	74.399	0.099	0.000	0.62	0.464	70.201	0.9		37.3	SURCHARGED
7.000	15	60 minute 30 year Summer I+0%	60	75.200	74.535	0.010	0.000	0.63	0.037	19.706	0.8		19.8	SURCHARGED
7.001	RG03	60 minute 30 year Summer I+0%	60	75.200	74.529	0.054	0.000	0.09	10.877	18.556	1.5	32	5.8	SURCHARGED
8.000	SW28	60 minute 30 year Summer I+0%	60	75.200	74.320	0.020	0.000	0.26	0.026	4.575	0.9		4.7	SURCHARGED
1.008	SW10	60 minute 30 year Summer I+0%	60	75.200	74.311	0.049	0.000	0.67	0.693	99.640	1.1		50.9	SURCHARGED
1.009	SW11	60 minute 30 year Summer I+0%	60	75.200	74.206	0.096	0.000	0.78	1.818	102.775	1.0		54.7	SURCHARGED
9.000	16	60 minute 30 year Summer I+0%	60	75.200	74.440	0.040	0.000	0.24	2.312	12.316	1.3	10	7.1	SURCHARGED
9.001	21	60 minute 30 year Summer I+0%	60	75.200	74.428	0.250	0.000	0.24	0.507	12.316	1.7		7.1	SURCHARGED
1.010	SW12	60 minute 30 year Summer I+0%	60	75.200	74.100	0.068	0.000	0.78	1.013	117.175	1.2		63.0	SURCHARGED
10.000	SW13	60 minute 30 year Summer I+0%	60	75.200	74.197	-0.103	0.000	0.21	0.007	5.983	1.3		6.2	OK
1.011	SW14	60 minute 30 year Summer I+0%	60	75.200	73.977	0.050	0.000	0.99	0.927	129.112	1.1		70.7	SURCHARGED
1.012	SW15	60 minute 30 year Summer I+0%	60	75.200	73.876	0.031	0.000	1.29	0.797	139.628	1.1		78.3	SURCHARGED
11.000	SW23	60 minute 30 year Summer I+0%	60	78.850	78.144	-0.096	0.000	0.28	0.008	4.927	0.9		5.1	OK
11.001	SW22	60 minute 30 year Summer I+0%	60	78.850	77.965	-0.085	0.000	0.39	0.810	13.021	1.8	11	12.7	OK
12.000	SW27	60 minute 30 year Summer I+0%	60	79.000	78.220	-0.030	0.000	0.44	0.018	8.446	1.1		8.8	OK
13.000	SW30	60 minute 30 year Summer I+0%	60	79.000	78.211	-0.039	0.000	0.15	0.017	2.816	0.7		2.9	OK
14.000	SW31	60 minute 30 year Summer I+0%	60	79.000	78.209	-0.041	0.000	0.10	0.017	2.112	0.8		2.1	OK
15.000	SW32	60 minute 30 year Summer I+0%	60	79.000	78.210	-0.040	0.000	0.27	0.017	2.464	0.5		2.5	OK
12.001	RG05	60 minute 30 year Summer I+0%	60	79.000	78.206	0.106	0.000	0.27	10.332	21.729	1.9	23	9.5	SURCHARGED
16.000	SW29	60 minute 30 year Summer I+0%	60	79.000	77.999	-0.101	0.000	0.23	0.007	6.335	1.3		6.6	OK
12.002	SW28	60 minute 30 year Summer I+0%	60	79.000	77.697	-0.064	0.000	0.61	0.031	28.060	1.4		14.3	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
17.000	SW33	60 minute 30 year Summer I+0%	60	79.000	77.898	-0.128	0.000	0.05	0.003	2.112	1.4		2.2	OK
18.000	SW18	60 minute 30 year Summer I+0%	60	79.000	77.975	-0.125	0.000	0.40	0.027	14.780	0.9		15.0	OK
18.001	SW19	60 minute 30 year Summer I+0%	60	79.000	77.821	-0.081	0.000	0.61	0.334	23.225	1.0		22.4	OK
19.000	RG04	60 minute 30 year Summer I+0%	60	78.850	77.945	-0.105	0.000	0.20	0.006	6.688	1.6	9	6.9	OK
18.002	SW20	60 minute 30 year Summer I+0%	60	78.850	77.772	0.000	0.000	1.03	0.676	29.915	0.8		27.5	OK
20.000	43	60 minute 30 year Summer I+0%	60	78.700	77.756	0.006	0.000	0.11	1.112	2.107	0.7	41	0.9	SURCHARGED
20.001	44	60 minute 30 year Summer I+0%	60	78.775	77.754	0.112	0.000	0.05	0.263	1.985	0.6		0.4	SURCHARGED
18.003	SW21	60 minute 30 year Summer I+0%	60	78.850	77.496	-0.088	0.000	0.68	0.118	31.892	1.1		27.8	OK
11.002	SW24	60 minute 30 year Summer I+0%	60	78.100	77.237	-0.132	0.000	0.36	0.137	81.764	4.0		62.3	OK
11.003	SW25	60 minute 30 year Summer I+0%	60	76.421	75.420	-0.101	0.000	0.59	0.027	83.870	2.9		64.3	OK
11.004	SW26	60 minute 30 year Summer I+0%	60	75.200	74.211	-0.082	0.000	0.72	0.188	91.603	2.7		71.7	OK
1.013	SW16	60 minute 30 year Summer I+0%	60	75.200	73.659	-0.129	0.000	0.85	0.825	231.198	1.2		143.3	OK
1.014	SW17	60 minute 30 year Summer I+0%	60	75.200	73.392	-0.157	0.000	0.74	0.273	241.383	1.4		150.4	OK
1.015	60	60 minute 30 year Summer I+0%	60	75.020	73.137	-0.283	0.000	0.29	0.568	241.348	2.8		151.1	OK
1.016	19	960 minute 30 year Winter I+0%	960	73.200	72.392	0.617	0.000	0.01	347.502	437.337	0.1		2.0	SURCHARGED
1.017	21	960 minute 30 year Winter I+0%	960	73.345	71.218	-0.657	0.000	0.00	0.046	437.317	0.2		2.0	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s) Summer and Winter
Duration(s) (mins) 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SW01	60 minute 100 year Summer I+40%	60	79.000	78.537	0.437	0.000	1.07	0.093	20.405	1.1		19.8	SURCHARGED
2.000	SW03	60 minute 100 year Summer I+40%	60	79.000	78.487	0.387	0.000	0.19	0.085	5.101	1.1		4.7	SURCHARGED

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
3.000	SW02	60 minute 100 year Summer I+40%	60	79.000	78.490	0.390	0.000	0.26	0.085	5.830	1.0		5.4	SURCHARGED
1.001	6	60 minute 100 year Summer I+40%	60	78.600	78.483	0.683	0.000	0.87	24.853	50.629	1.4	28	16.8	FLOOD RISK
4.000	RG01	60 minute 100 year Summer I+40%	60	78.600	77.884	-0.016	0.000	0.24	1.625	5.100	0.5	17	3.2	OK
4.001	2	60 minute 100 year Summer I+40%	60	78.800	77.878	0.024	0.000	0.25	0.089	5.100	0.8		3.3	SURCHARGED
4.002	SW04	60 minute 100 year Summer I+40%	60	79.000	77.814	0.006	0.000	0.33	0.080	9.472	1.1		7.0	SURCHARGED
1.002	SW05	60 minute 100 year Summer I+40%	60	78.600	77.802	0.152	0.000	0.50	0.411	60.096	1.0		21.9	SURCHARGED
1.003	SW06	60 minute 100 year Summer I+40%	60	78.600	77.752	0.215	0.000	0.34	0.548	60.089	1.3		21.5	SURCHARGED
5.000	SW26	60 minute 100 year Summer I+40%	60	78.900	78.019	0.019	0.000	1.32	0.026	13.846	0.8		14.3	SURCHARGED
5.001	SW27	60 minute 100 year Summer I+40%	60	78.900	77.893	-0.080	0.000	0.43	0.026	13.846	1.8		14.2	OK
1.004	RG02	60 minute 100 year Summer I+40%	60	78.600	77.734	0.633	0.000	5.83	30.430	114.641	2.3	26	39.9	SURCHARGED
1.005	SW07	60 minute 100 year Summer I+40%	60	78.000	77.256	0.156	0.000	1.09	0.212	114.620	2.4		39.9	SURCHARGED
6.000	14	60 minute 100 year Summer I+40%	60	78.150	77.139	0.189	0.000	0.96	0.378	16.760	1.0		15.5	SURCHARGED
6.001	15	60 minute 100 year Summer I+40%	60	77.800	76.941	0.341	0.000	1.77	1.214	29.148	1.4		24.1	SURCHARGED
1.006	SW08	60 minute 100 year Summer I+40%	60	78.000	76.764	0.226	0.000	0.92	0.323	146.665	4.1		59.9	SURCHARGED
1.007	SW09	60 minute 100 year Summer I+40%	60	75.200	74.950	0.650	0.000	1.01	1.144	146.631	0.9		61.2	FLOOD RISK
7.000	15	60 minute 100 year Summer I+40%	60	75.200	75.129	0.604	0.000	1.26	0.131	40.780	1.0		39.6	FLOOD RISK
7.001	RG03	60 minute 100 year Summer I+40%	60	75.200	75.114	0.639	0.000	0.16	25.765	38.016	1.8	39	10.6	FLOOD RISK
8.000	SW28	60 minute 100 year Summer I+40%	60	75.200	74.890	0.590	0.000	0.47	0.117	9.474	0.9		8.8	SURCHARGED
1.008	SW10	60 minute 100 year Summer I+40%	60	75.200	74.869	0.607	0.000	1.07	0.914	207.136	1.2		81.5	SURCHARGED
1.009	SW11	60 minute 100 year Summer I+40%	60	75.200	74.699	0.589	0.000	1.24	2.018	213.605	1.2		86.7	SURCHARGED
9.000	16	60 minute 100 year Summer I+40%	60	75.200	74.961	0.561	0.000	0.33	8.950	25.506	1.3	17	9.8	FLOOD RISK
9.001	21	60 minute 100 year Summer I+40%	60	75.200	74.943	0.765	0.000	0.35	1.090	25.505	1.7		10.3	FLOOD RISK
1.010	SW12	60 minute 100 year Summer I+40%	60	75.200	74.580	0.548	0.000	1.21	1.185	243.401	1.4		97.2	SURCHARGED
10.000	SW13	60 minute 100 year Summer I+40%	60	75.200	74.478	0.178	0.000	0.41	0.051	12.391	1.5		11.8	SURCHARGED
1.011	SW14	60 minute 100 year Summer I+40%	60	75.200	74.432	0.505	0.000	1.63	1.248	268.102	1.6		116.7	SURCHARGED
1.012	SW15	60 minute 100 year Summer I+40%	60	75.200	74.212	0.367	0.000	2.23	0.943	289.867	1.9		136.1	SURCHARGED
11.000	SW23	60 minute 100 year Summer I+40%	60	78.850	78.172	-0.068	0.000	0.58	0.012	10.203	1.1		10.6	OK
11.001	SW22	60 minute 100 year Summer I+40%	60	78.850	78.002	-0.048	0.000	0.80	1.283	26.964	2.1	10	26.4	OK
12.000	SW27	60 minute 100 year Summer I+40%	60	79.000	78.724	0.474	0.000	0.88	0.098	17.490	1.1		17.3	FLOOD RISK
13.000	SW30	60 minute 100 year Summer I+40%	60	79.000	78.707	0.457	0.000	0.31	0.096	5.830	0.7		5.7	FLOOD RISK
14.000	SW31	60 minute 100 year Summer I+40%	60	79.000	78.703	0.453	0.000	0.19	0.095	4.372	0.8		4.3	FLOOD RISK
15.000	SW32	60 minute 100 year Summer I+40%	60	79.000	78.706	0.456	0.000	0.53	0.096	5.101	0.4		5.0	FLOOD RISK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
12.001	RG05	60 minute 100 year Summer I+40%	60	79.000	78.699	0.599	0.000	0.50	21.530	45.573	2.2	28	17.4	SURCHARGED
16.000	SW29	60 minute 100 year Summer I+40%	60	79.000	78.024	-0.076	0.000	0.48	0.011	13.119	1.6		13.6	OK
12.002	SW28	60 minute 100 year Summer I+40%	60	79.000	77.870	0.109	0.000	1.12	0.179	58.685	1.5		26.1	SURCHARGED
17.000	SW33	60 minute 100 year Summer I+40%	60	79.000	77.909	-0.117	0.000	0.11	0.004	4.374	1.6		4.5	OK
18.000	SW18	60 minute 100 year Summer I+40%	60	79.000	78.378	0.278	0.000	0.78	0.141	30.605	1.0		29.5	SURCHARGED
18.001	SW19	60 minute 100 year Summer I+40%	60	79.000	78.258	0.356	0.000	1.24	1.443	48.097	1.2		45.5	SURCHARGED
19.000	RG04	60 minute 100 year Summer I+40%	60	78.850	78.098	0.048	0.000	0.40	0.676	13.849	1.8	4	13.9	SURCHARGED
18.002	SW20	60 minute 100 year Summer I+40%	60	78.850	78.073	0.301	0.000	2.02	1.084	61.945	1.4		54.1	SURCHARGED
20.000	43	60 minute 100 year Summer I+40%	60	78.700	77.855	0.105	0.000	0.10	3.294	2.885	0.6		0.8	SURCHARGED
20.001	44	60 minute 100 year Summer I+40%	60	78.775	77.852	0.210	0.000	0.06	0.375	2.581	0.6		0.5	SURCHARGED
18.003	SW21	60 minute 100 year Summer I+40%	60	78.850	77.724	0.140	0.000	1.30	1.129	64.515	1.3		53.2	SURCHARGED
11.002	SW24	60 minute 100 year Summer I+40%	60	78.100	77.281	-0.088	0.000	0.68	0.328	168.371	4.7		118.4	OK
11.003	SW25	60 minute 100 year Summer I+40%	60	76.421	76.361	0.840	0.000	1.11	0.409	172.736	3.1		122.0	FLOOD RISK
11.004	SW26	60 minute 100 year Summer I+40%	60	75.200	74.861	0.568	0.000	1.36	1.384	188.753	3.4		135.0	SURCHARGED
1.013	SW16	60 minute 100 year Summer I+40%	60	75.200	73.910	0.122	0.000	1.60	1.778	478.526	1.7		270.0	SURCHARGED
1.014	SW17	60 minute 100 year Summer I+40%	60	75.200	73.661	0.112	0.000	1.42	1.172	499.601	1.8		288.0	SURCHARGED
1.015	60	60 minute 100 year Summer I+40%	60	75.020	73.212	-0.208	0.000	0.56	1.012	499.501	3.3		287.4	OK
1.016	19	1440 minute 100 year Winter I+40%	1440	73.200	73.132	1.357	0.000	0.01	717.536	697.159	0.1		2.5	FLOOD RISK
1.017	21	1440 minute 100 year Winter I+40%	1440	73.345	71.220	-0.655	0.000	0.01	0.055	697.101	0.3		2.5	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.436 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SW01	15 minute 1 year Summer I+0%	15	79.000	78.015	-0.085	0.000	0.39	0.009	2.233	1.0		7.2	OK
2.000	SW03	15 minute 1 year Summer I+0%	15	79.000	77.976	-0.124	0.000	0.07	0.003	0.559	0.9		1.8	OK
3.000	SW02	15 minute 1 year Summer I+0%	15	79.000	77.982	-0.118	0.000	0.10	0.004	0.638	0.8		2.1	OK
1.001	6	30 minute 1 year Summer I+0%	30	78.600	77.762	-0.038	0.000	0.23	4.281	7.263	1.0	21	4.5	OK
4.000	RG01	15 minute 1 year Summer I+0%	15	78.600	77.775	-0.125	0.000	0.07	0.307	0.558	0.5	10	0.9	OK
4.001	2	15 minute 1 year Summer I+0%	15	78.800	77.751	-0.103	0.000	0.07	0.023	0.558	0.5		0.9	OK
4.002	SW04	15 minute 1 year Summer I+0%	15	79.000	77.687	-0.121	0.000	0.08	0.013	1.036	0.7		1.8	OK
1.002	SW05	30 minute 1 year Summer I+0%	30	78.600	77.479	-0.171	0.000	0.13	0.015	8.598	0.8		5.9	OK
1.003	SW06	30 minute 1 year Summer I+0%	30	78.600	77.358	-0.179	0.000	0.09	0.039	8.598	1.0		5.9	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
5.000	SW26	15 minute 1 year Summer I+0%	15	78.900	77.920	-0.080	0.000	0.45	0.010	1.515	0.6		4.9	OK
5.001	SW27	15 minute 1 year Summer I+0%	15	78.900	77.861	-0.112	0.000	0.15	0.013	1.515	1.4		4.9	OK
1.004	RG02	30 minute 1 year Summer I+0%	30	78.600	77.116	0.015	0.000	1.18	6.351	16.473	0.5	23	8.1	SURCHARGED
1.005	SW07	30 minute 1 year Summer I+0%	30	78.000	76.998	-0.102	0.000	0.22	0.044	16.473	1.7		8.1	OK
6.000	14	15 minute 1 year Summer I+0%	15	78.150	76.863	-0.087	0.000	0.34	0.065	1.834	0.8		5.5	OK
6.001	15	15 minute 1 year Summer I+0%	15	77.800	76.534	-0.066	0.000	0.59	0.137	3.189	0.8		8.1	OK
1.006	SW08	30 minute 1 year Summer I+0%	30	78.000	76.432	-0.106	0.000	0.19	0.036	20.991	2.9		12.4	OK
1.007	SW09	30 minute 1 year Summer I+0%	30	75.200	74.092	-0.208	0.000	0.20	0.098	20.991	0.7		12.3	OK
7.000	15	15 minute 1 year Summer I+0%	15	75.200	74.407	-0.118	0.000	0.46	0.016	4.465	0.8		14.4	OK
7.001	RG03	30 minute 1 year Summer I+0%	30	75.200	74.349	-0.126	0.000	0.04	3.855	5.702	1.2	27	2.8	OK
8.000	SW28	15 minute 1 year Summer I+0%	15	75.200	74.193	-0.107	0.000	0.18	0.006	1.037	0.8		3.3	OK
1.008	SW10	30 minute 1 year Summer I+0%	30	75.200	74.062	-0.200	0.000	0.24	0.095	29.876	0.9		18.6	OK
1.009	SW11	30 minute 1 year Summer I+0%	30	75.200	73.918	-0.192	0.000	0.28	0.189	30.800	0.9		19.7	OK
9.000	16	15 minute 1 year Summer I+0%	15	75.200	74.311	-0.089	0.000	0.25	0.741	2.790	1.3	5	7.3	OK
9.001	21	15 minute 1 year Summer I+0%	15	75.200	74.305	0.127	0.000	0.19	0.358	2.790	1.6		5.7	SURCHARGED
1.010	SW12	30 minute 1 year Summer I+0%	30	75.200	73.849	-0.183	0.000	0.32	0.210	35.010	1.0		25.8	OK
10.000	SW13	15 minute 1 year Summer I+0%	15	75.200	74.189	-0.111	0.000	0.15	0.005	1.356	1.2		4.4	OK
1.011	SW14	30 minute 1 year Summer I+0%	30	75.200	73.761	-0.166	0.000	0.41	0.221	38.502	1.0		29.8	OK
1.012	SW15	15 minute 1 year Summer I+0%	15	75.200	73.705	-0.140	0.000	0.55	0.318	32.266	0.9		33.8	OK
11.000	SW23	15 minute 1 year Summer I+0%	15	78.850	78.135	-0.105	0.000	0.20	0.006	1.117	0.8		3.6	OK
11.001	SW22	15 minute 1 year Summer I+0%	15	78.850	77.945	-0.105	0.000	0.19	0.562	2.950	1.5	9	6.4	OK
12.000	SW27	15 minute 1 year Summer I+0%	15	79.000	78.157	-0.093	0.000	0.31	0.008	1.914	1.0		6.2	OK
13.000	SW30	15 minute 1 year Summer I+0%	15	79.000	78.133	-0.117	0.000	0.11	0.004	0.638	0.7		2.1	OK
14.000	SW31	15 minute 1 year Summer I+0%	15	79.000	78.126	-0.124	0.000	0.07	0.003	0.479	0.8		1.5	OK
15.000	SW32	15 minute 1 year Summer I+0%	15	79.000	78.144	-0.106	0.000	0.19	0.006	0.558	0.4		1.8	OK
12.001	RG05	30 minute 1 year Summer I+0%	30	79.000	78.052	-0.048	0.000	0.11	4.002	6.544	1.5	22	3.9	OK
16.000	SW29	15 minute 1 year Summer I+0%	15	79.000	77.990	-0.110	0.000	0.16	0.006	1.436	1.2		4.6	OK
12.002	SW28	15 minute 1 year Summer I+0%	15	79.000	77.664	-0.097	0.000	0.24	0.019	6.513	1.1		5.7	OK
17.000	SW33	15 minute 1 year Summer I+0%	15	79.000	77.894	-0.132	0.000	0.04	0.002	0.479	1.3		1.5	OK
18.000	SW18	15 minute 1 year Summer I+0%	15	79.000	77.957	-0.143	0.000	0.27	0.022	3.349	0.8		10.4	OK
18.001	SW19	15 minute 1 year Summer I+0%	15	79.000	77.774	-0.128	0.000	0.37	0.134	5.262	0.9		13.6	OK
19.000	RG04	15 minute 1 year Summer I+0%	15	78.850	77.937	-0.113	0.000	0.14	0.005	1.517	1.4	3	4.9	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
18.002	SW20	15 minute 1 year Summer I+0%	15	78.850	77.682	-0.090	0.000	0.65	0.287	6.779	0.7		17.4	OK
20.000	43	30 minute 1 year Summer I+0%	30	78.700	77.673	-0.077	0.000	0.12	0.069	0.369	0.7	11	0.9	OK
20.001	44	30 minute 1 year Winter I+0%	30	78.775	77.666	0.024	0.000	0.04	0.152	0.369	0.5		0.3	SURCHARGED
18.003	SW21	15 minute 1 year Summer I+0%	15	78.850	77.464	-0.120	0.000	0.42	0.029	6.986	1.0		17.3	OK
11.002	SW24	15 minute 1 year Summer I+0%	15	78.100	77.210	-0.159	0.000	0.18	0.095	18.430	3.4		31.8	OK
11.003	SW25	15 minute 1 year Summer I+0%	15	76.421	75.380	-0.141	0.000	0.30	0.016	18.908	2.4		32.9	OK
11.004	SW26	15 minute 1 year Summer I+0%	15	75.200	74.162	-0.131	0.000	0.37	0.113	20.662	2.3		36.3	OK
1.013	SW16	15 minute 1 year Summer I+0%	15	75.200	73.539	-0.249	0.000	0.41	0.309	52.928	1.0		69.8	OK
1.014	SW17	15 minute 1 year Summer I+0%	15	75.200	73.288	-0.261	0.000	0.36	0.066	55.240	1.2		73.7	OK
1.015	60	15 minute 1 year Summer I+0%	15	75.020	73.084	-0.336	0.000	0.14	0.288	55.240	2.4		73.4	OK
1.016	19	30 minute 1 year Summer I+0%	30	73.200	71.521	-0.254	0.000	0.01	60.811	67.615	0.0		1.8	OK
1.017	21	30 minute 1 year Summer I+0%	30	73.345	71.217	-0.658	0.000	0.00	0.043	67.593	0.2		1.8	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.436 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SW01	15 minute 30 year Summer I+0%	15	79.000	78.088	-0.012	0.000	0.97	0.021	5.481	1.2		18.1	OK
2.000	SW03	15 minute 30 year Summer I+0%	15	79.000	77.992	-0.108	0.000	0.17	0.006	1.371	1.1		4.4	OK
3.000	SW02	15 minute 30 year Summer I+0%	15	79.000	78.000	-0.100	0.000	0.25	0.007	1.567	1.0		5.1	OK
1.001	6	30 minute 30 year Summer I+0%	30	78.600	77.918	0.118	0.000	0.50	10.481	17.810	1.2	18	9.7	SURCHARGED
4.000	RG01	15 minute 30 year Summer I+0%	15	78.600	77.811	-0.089	0.000	0.17	0.746	1.370	0.5	7	2.3	OK
4.001	2	15 minute 30 year Summer I+0%	15	78.800	77.818	-0.036	0.000	0.18	0.059	1.370	0.7		2.4	OK
4.002	SW04	15 minute 30 year Summer I+0%	15	79.000	77.704	-0.104	0.000	0.21	0.022	2.544	0.9		4.4	OK
1.002	SW05	30 minute 30 year Summer I+0%	30	78.600	77.511	-0.139	0.000	0.31	0.025	21.076	1.0		13.5	OK
1.003	SW06	30 minute 30 year Summer I+0%	30	78.600	77.382	-0.155	0.000	0.21	0.063	21.076	1.3		13.5	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
5.000	SW26	15 minute 30 year Summer I+0%	15	78.900	78.002	0.002	0.000	1.11	0.023	3.719	0.7		12.0	SURCHARGED
5.001	SW27	15 minute 30 year Summer I+0%	15	78.900	77.886	-0.087	0.000	0.37	0.023	3.719	1.7		12.1	OK
1.004	RG02	30 minute 30 year Summer I+0%	30	78.600	77.286	0.185	0.000	3.51	12.995	40.388	1.4	20	24.1	SURCHARGED
1.005	SW07	30 minute 30 year Summer I+0%	30	78.000	77.039	-0.061	0.000	0.66	0.086	40.388	2.2		24.1	OK
6.000	14	15 minute 30 year Summer I+0%	15	78.150	76.932	-0.018	0.000	0.82	0.144	4.500	1.0		13.3	OK
6.001	15	15 minute 30 year Summer I+0%	15	77.800	76.683	0.083	0.000	1.56	0.553	7.827	1.2		21.2	SURCHARGED
1.006	SW08	15 minute 30 year Summer I+0%	15	78.000	76.472	-0.066	0.000	0.60	0.074	40.061	3.9		39.3	OK
1.007	SW09	30 minute 30 year Summer I+0%	30	75.200	74.422	0.122	0.000	0.63	0.492	51.442	0.9		37.9	SURCHARGED
7.000	15	15 minute 30 year Summer I+0%	15	75.200	74.542	0.017	0.000	1.12	0.038	10.959	0.9		35.1	SURCHARGED
7.001	RG03	30 minute 30 year Summer I+0%	30	75.200	74.490	0.015	0.000	0.08	9.380	14.018	1.5	26	5.3	SURCHARGED
8.000	SW28	15 minute 30 year Summer I+0%	15	75.200	74.347	0.047	0.000	0.44	0.030	2.546	1.0		8.2	SURCHARGED
1.008	SW10	15 minute 30 year Summer I+0%	15	75.200	74.340	0.078	0.000	0.67	0.725	57.036	1.1		51.0	SURCHARGED
1.009	SW11	15 minute 30 year Summer I+0%	15	75.200	74.236	0.126	0.000	0.79	1.864	58.797	1.0		55.6	SURCHARGED
9.000	16	15 minute 30 year Summer I+0%	15	75.200	74.476	0.076	0.000	0.27	2.749	6.849	1.3	8	7.9	SURCHARGED
9.001	21	15 minute 30 year Summer I+0%	15	75.200	74.466	0.288	0.000	0.25	0.550	6.849	1.7		7.4	SURCHARGED
1.010	SW12	15 minute 30 year Summer I+0%	15	75.200	74.120	0.088	0.000	0.80	1.037	66.820	1.2		64.1	SURCHARGED
10.000	SW13	15 minute 30 year Summer I+0%	15	75.200	74.213	-0.087	0.000	0.37	0.009	3.329	1.5		10.7	OK
1.011	SW14	30 minute 30 year Summer I+0%	30	75.200	73.987	0.060	0.000	1.00	0.945	94.354	1.1		71.8	SURCHARGED
1.012	SW15	30 minute 30 year Summer I+0%	30	75.200	73.878	0.033	0.000	1.29	0.799	101.891	1.1		78.7	SURCHARGED
11.000	SW23	15 minute 30 year Summer I+0%	15	78.850	78.163	-0.077	0.000	0.48	0.011	2.741	1.0		8.8	OK
11.001	SW22	15 minute 30 year Summer I+0%	15	78.850	77.984	-0.066	0.000	0.58	1.060	7.242	1.9	5	19.3	OK
12.000	SW27	15 minute 30 year Summer I+0%	15	79.000	78.201	-0.049	0.000	0.77	0.015	4.697	1.2		15.2	OK
13.000	SW30	30 minute 30 year Summer I+0%	30	79.000	78.188	-0.062	0.000	0.21	0.013	2.010	0.8		3.9	OK
14.000	SW31	30 minute 30 year Summer I+0%	30	79.000	78.186	-0.064	0.000	0.13	0.013	1.507	0.9		2.9	OK
15.000	SW32	30 minute 30 year Summer I+0%	30	79.000	78.188	-0.062	0.000	0.36	0.013	1.759	0.5		3.4	OK
12.001	RG05	30 minute 30 year Summer I+0%	30	79.000	78.184	0.084	0.000	0.26	9.429	16.049	1.9	18	8.9	SURCHARGED
16.000	SW29	15 minute 30 year Summer I+0%	15	79.000	78.016	-0.084	0.000	0.40	0.010	3.525	1.5		11.4	OK
12.002	SW28	15 minute 30 year Summer I+0%	15	79.000	77.711	-0.050	0.000	0.70	0.036	16.021	1.4		16.3	OK
17.000	SW33	15 minute 30 year Summer I+0%	15	79.000	77.906	-0.120	0.000	0.09	0.004	1.175	1.5		3.8	OK
18.000	SW18	15 minute 30 year Summer I+0%	15	79.000	78.037	-0.063	0.000	0.67	0.045	8.218	1.0		25.4	OK
18.001	SW19	15 minute 30 year Summer I+0%	15	79.000	77.960	0.058	0.000	0.86	1.053	12.918	0.9		31.4	SURCHARGED
19.000	RG04	15 minute 30 year Summer I+0%	15	78.850	77.960	-0.090	0.000	0.34	0.009	3.722	1.8	3	12.0	OK

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
18.002	SW20	15 minute 30 year Summer I+0%	15	78.850	77.869	0.097	0.000	1.42	0.971	16.639	1.0		38.0	SURCHARGED
20.000	43	30 minute 30 year Summer I+0%	30	78.700	77.739	-0.011	0.000	0.24	0.799	1.409	0.8	25	1.9	OK
20.001	44	30 minute 30 year Summer I+0%	30	78.775	77.737	0.095	0.000	0.05	0.243	1.409	0.6		0.4	SURCHARGED
18.003	SW21	15 minute 30 year Summer I+0%	15	78.850	77.530	-0.054	0.000	0.92	0.213	17.659	1.2		37.8	OK
11.002	SW24	15 minute 30 year Summer I+0%	15	78.100	77.252	-0.117	0.000	0.46	0.171	45.803	4.3		80.5	OK
11.003	SW25	15 minute 30 year Summer I+0%	15	76.421	75.443	-0.078	0.000	0.75	0.035	46.977	3.0		82.9	OK
11.004	SW26	15 minute 30 year Summer I+0%	15	75.200	74.242	-0.051	0.000	0.93	0.239	51.283	2.9		92.6	OK
1.013	SW16	15 minute 30 year Summer I+0%	15	75.200	73.687	-0.101	0.000	0.95	0.968	130.630	1.2		160.1	OK
1.014	SW17	15 minute 30 year Summer I+0%	15	75.200	73.426	-0.123	0.000	0.86	0.377	136.305	1.4		173.1	OK
1.015	60	15 minute 30 year Summer I+0%	15	75.020	73.151	-0.269	0.000	0.34	0.644	136.304	2.9		172.8	OK
1.016	19	30 minute 30 year Summer I+0%	30	73.200	71.886	0.111	0.000	0.01	163.435	94.303	0.0		1.8	SURCHARGED
1.017	21	15 minute 30 year Summer I+0%	15	73.345	71.217	-0.658	0.000	0.00	0.043	102.195	0.2		1.8	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.436 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SW01	15 minute 100 year Summer I+40%	15	79.000	78.531	0.431	0.000	1.70	0.092	9.966	1.8		31.7	SURCHARGED
2.000	SW03	30 minute 100 year Summer I+40%	30	79.000	78.322	0.222	0.000	0.24	0.058	3.224	1.2		6.2	SURCHARGED
3.000	SW02	30 minute 100 year Summer I+40%	30	79.000	78.324	0.224	0.000	0.34	0.059	3.684	1.1		7.1	SURCHARGED
1.001	6	30 minute 100 year Summer I+40%	30	78.600	78.318	0.518	0.000	0.85	19.133	32.669	1.3	22	16.4	FLOOD RISK
4.000	RG01	30 minute 100 year Summer I+40%	30	78.600	77.874	-0.026	0.000	0.24	1.509	3.224	0.5	9	3.3	OK
4.001	2	30 minute 100 year Summer I+40%	30	78.800	77.869	0.015	0.000	0.25	0.085	3.224	0.8		3.4	SURCHARGED
4.002	SW04	15 minute 100 year Summer I+40%	15	79.000	77.723	-0.085	0.000	0.36	0.032	4.627	1.1		7.5	OK
1.002	SW05	30 minute 100 year Summer I+40%	30	78.600	77.600	-0.050	0.000	0.47	0.123	38.656	1.1		20.8	OK
1.003	SW06	30 minute 100 year Summer I+40%	30	78.600	77.570	0.033	0.000	0.32	0.426	38.656	1.3		20.7	SURCHARGED

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
5.000	SW26	15 minute 100 year Summer I+40%	15	78.900	78.087	0.087	0.000	2.02	0.037	6.764	1.2		21.9	SURCHARGED
5.001	SW27	15 minute 100 year Summer I+40%	15	78.900	77.914	-0.059	0.000	0.67	0.034	6.765	2.0		22.0	OK
1.004	RG02	30 minute 100 year Summer I+40%	30	78.600	77.551	0.450	0.000	5.36	23.364	74.086	2.1	19	36.7	SURCHARGED
1.005	SW07	15 minute 100 year Summer I+40%	15	78.000	77.156	0.056	0.000	0.95	0.183	57.246	2.4		34.7	SURCHARGED
6.000	14	15 minute 100 year Summer I+40%	15	78.150	77.490	0.540	0.000	1.23	0.775	8.186	1.2		20.0	SURCHARGED
6.001	15	15 minute 100 year Summer I+40%	15	77.800	77.031	0.431	0.000	2.33	1.325	14.237	1.8		31.8	SURCHARGED
1.006	SW08	15 minute 100 year Summer I+40%	15	78.000	76.782	0.244	0.000	0.93	0.334	72.907	4.1		60.6	SURCHARGED
1.007	SW09	15 minute 100 year Summer I+40%	15	75.200	74.908	0.608	0.000	1.04	1.092	72.907	0.9		63.1	FLOOD RISK
7.000	15	30 minute 100 year Summer I+40%	30	75.200	74.959	0.434	0.000	1.49	0.104	25.791	1.2		47.0	FLOOD RISK
7.001	RG03	30 minute 100 year Summer I+40%	30	75.200	74.950	0.475	0.000	0.15	19.159	25.738	1.8	32	9.5	FLOOD RISK
8.000	SW28	15 minute 100 year Summer I+40%	15	75.200	74.850	0.550	0.000	0.74	0.111	4.627	1.1		13.8	SURCHARGED
1.008	SW10	15 minute 100 year Summer I+40%	15	75.200	74.829	0.567	0.000	1.01	0.903	103.834	1.1		77.0	SURCHARGED
1.009	SW11	15 minute 100 year Summer I+40%	15	75.200	74.691	0.581	0.000	1.17	2.015	107.038	1.2		81.9	SURCHARGED
9.000	16	30 minute 100 year Summer I+40%	30	75.200	74.814	0.414	0.000	0.31	6.855	16.119	1.4	14	9.0	SURCHARGED
9.001	21	30 minute 100 year Summer I+40%	30	75.200	74.801	0.623	0.000	0.32	0.929	16.119	1.8		9.4	SURCHARGED
1.010	SW12	15 minute 100 year Summer I+40%	15	75.200	74.586	0.554	0.000	1.14	1.187	121.631	1.3		92.0	SURCHARGED
10.000	SW13	15 minute 100 year Summer I+40%	15	75.200	74.513	0.213	0.000	0.63	0.057	6.055	1.8		18.3	SURCHARGED
1.011	SW14	15 minute 100 year Summer I+40%	15	75.200	74.457	0.530	0.000	1.55	1.255	133.737	1.6		111.4	SURCHARGED
1.012	SW15	15 minute 100 year Summer I+40%	15	75.200	74.248	0.403	0.000	2.22	0.953	144.415	1.9		135.1	SURCHARGED
11.000	SW23	15 minute 100 year Summer I+40%	15	78.850	78.199	-0.041	0.000	0.88	0.017	4.985	1.2		16.1	OK
11.001	SW22	15 minute 100 year Summer I+40%	15	78.850	78.035	-0.015	0.000	1.00	1.717	13.172	2.1	5	33.0	OK
12.000	SW27	15 minute 100 year Summer I+40%	15	79.000	78.512	0.262	0.000	1.36	0.065	8.542	1.5		26.8	SURCHARGED
13.000	SW30	30 minute 100 year Summer I+40%	30	79.000	78.479	0.229	0.000	0.36	0.059	3.684	0.9		6.7	SURCHARGED
14.000	SW31	30 minute 100 year Summer I+40%	30	79.000	78.476	0.226	0.000	0.22	0.059	2.763	0.9		5.0	SURCHARGED
15.000	SW32	30 minute 100 year Summer I+40%	30	79.000	78.478	0.228	0.000	0.62	0.059	3.224	0.5		5.8	SURCHARGED
12.001	RG05	30 minute 100 year Summer I+40%	30	79.000	78.473	0.373	0.000	0.41	17.408	29.445	2.1	22	14.3	SURCHARGED
16.000	SW29	15 minute 100 year Summer I+40%	15	79.000	78.108	0.008	0.000	0.72	0.024	6.411	1.7		20.2	SURCHARGED
12.002	SW28	15 minute 100 year Summer I+40%	15	79.000	77.978	0.217	0.000	1.18	0.291	29.162	1.5		27.5	SURCHARGED
17.000	SW33	15 minute 100 year Summer I+40%	15	79.000	77.916	-0.110	0.000	0.16	0.006	2.138	1.8		6.9	OK
18.000	SW18	15 minute 100 year Summer I+40%	15	79.000	78.787	0.687	0.000	1.03	0.257	14.939	1.1		38.9	FLOOD RISK
18.001	SW19	15 minute 100 year Summer I+40%	15	79.000	78.519	0.617	0.000	1.64	1.516	23.486	1.5		60.0	SURCHARGED
19.000	RG04	15 minute 100 year Summer I+40%	15	78.850	78.242	0.192	0.000	0.55	1.653	6.784	1.9	3	19.2	SURCHARGED

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
18.002	SW20	15 minute 100 year Summer I+40%	15	78.850	78.224	0.452	0.000	2.23	1.126	30.265	1.6		59.6	SURCHARGED
20.000	43	30 minute 100 year Summer I+40%	30	78.700	77.802	0.052	0.000	0.18	2.133	2.874	0.8	50	1.4	SURCHARGED
20.001	44	30 minute 100 year Summer I+40%	30	78.775	77.800	0.158	0.000	0.05	0.316	2.874	0.6		0.4	SURCHARGED
18.003	SW21	15 minute 100 year Summer I+40%	15	78.850	77.806	0.222	0.000	1.40	1.270	32.407	1.5		57.4	SURCHARGED
11.002	SW24	15 minute 100 year Summer I+40%	15	78.100	77.379	0.010	0.000	0.71	0.884	83.631	4.7		123.9	SURCHARGED
11.003	SW25	15 minute 100 year Summer I+40%	15	76.421	76.422	0.901	0.800	1.12	1.142	85.767	3.1		123.3	FLOOD
11.004	SW26	15 minute 100 year Summer I+40%	15	75.200	74.954	0.661	0.000	1.41	1.556	93.597	3.5		139.5	FLOOD RISK
1.013	SW16	15 minute 100 year Summer I+40%	15	75.200	73.936	0.148	0.000	1.63	1.832	238.013	1.7		275.0	SURCHARGED
1.014	SW17	15 minute 100 year Summer I+40%	15	75.200	73.686	0.137	0.000	1.47	1.243	248.335	1.9		296.9	SURCHARGED
1.015	60	15 minute 100 year Summer I+40%	15	75.020	73.216	-0.204	0.000	0.57	1.044	248.331	3.3		291.8	OK
1.016	19	30 minute 100 year Winter I+40%	30	73.200	72.289	0.514	0.000	0.01	305.638	105.517	0.1		1.9	SURCHARGED
1.017	21	30 minute 100 year Winter I+40%	30	73.345	71.218	-0.657	0.000	0.00	0.045	105.458	0.2		1.9	OK

Phase 2 Western Car Park

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	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	20.000	Volumetric Runoff Coeff.	1.000	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.400	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	120	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Time Area Diagram for Storm at outfall (pipe 1.017)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.461	4-8	0.238

Total Area Contributing (ha) = 0.699

Total Pipe Volume (m³) = 37.402

Time Area Diagram at outfall (pipe 21.002)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.562	4-8	0.061

Total Area Contributing (ha) = 0.623

Total Pipe Volume (m³) = 3.405

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
21.000	-	-	100	0.017	0.017	0.017
21.001	-	-	100	0.027	0.027	0.027
22.000	-	-	100	0.014	0.014	0.014
22.001	-	-	100	0.000	0.000	0.000
22.002	-	-	100	0.101	0.101	0.101
22.003	-	-	100	0.101	0.101	0.101
22.004	-	-	100	0.121	0.121	0.121
22.005	-	-	100	0.121	0.121	0.121
21.002	-	-	100	0.121	0.121	0.121
				Total	Total	Total
				0.623	0.623	0.623

Online Controls for Storm

Orifice Manhole: 56, DS/PN: 22.002, Volume (m³): 1.5

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 76.050

Orifice Manhole: 69, DS/PN: 22.003, Volume (m³): 1.5

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 75.950

Orifice Manhole: 57, DS/PN: 22.004, Volume (m³): 1.6

Diameter (m) 0.036 Discharge Coefficient 0.600 Invert Level (m) 74.700

Orifice Manhole: 71, DS/PN: 22.005, Volume (m³): 1.6

Diameter (m) 0.043 Discharge Coefficient 0.600 Invert Level (m) 74.200

Orifice Manhole: 64, DS/PN: 21.002, Volume (m³): 2.5

Diameter (m) 0.047 Discharge Coefficient 0.600 Invert Level (m) 73.350

Storage Structures for Storm

Porous Car Park Manhole: 56, DS/PN: 22.002

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	85.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	76.050	Depression Storage (mm)	5
Max Percolation (l/s)	232.2	Width (m)	44.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	19.0	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 69, DS/PN: 22.003

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	85.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	75.950	Depression Storage (mm)	5
Max Percolation (l/s)	232.2	Width (m)	44.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	19.0	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 57, DS/PN: 22.004

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	30.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	74.700	Depression Storage (mm)	5
Max Percolation (l/s)	295.6	Width (m)	56.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	19.0	Cap Volume Depth (m)	0.500

Porous Car Park Manhole: 71, DS/PN: 22.005

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	30.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	74.200	Depression Storage (mm)	5
Max Percolation (l/s)	295.6	Width (m)	56.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	19.0	Cap Volume Depth (m)	0.500

Porous Car Park Manhole: 64, DS/PN: 21.002

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	435.6	Porosity	0.30
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0	Invert Level (m)	73.350

Porous Car Park Manhole: 64, DS/PN: 21.002

Width (m)	56.0	Slope (1:X)	30.0	Evaporation (mm/day)	3
Length (m)	28.0	Depression Storage (mm)	5	Cap Volume Depth (m)	0.500

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	12	Number of Storage Structures	15	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
21.000	65	60 minute 1 year Summer I+0%	60	76.500	75.172	-0.128	0.000	0.05	0.019	2.012	1.3		2.1	OK
21.001	63	60 minute 1 year Summer I+0%	60	75.280	73.977	-0.103	0.000	0.21	0.051	5.207	1.0		4.7	OK
22.000	67	60 minute 1 year Summer I+0%	60	78.150	76.882	-0.118	0.000	0.10	0.030	1.657	0.6		1.7	OK
22.001	68	60 minute 1 year Summer I+0%	60	78.000	76.561	-0.126	0.000	0.06	0.032	1.657	0.9		1.7	OK
22.002	56	960 minute 1 year Summer I+0%	960	77.100	76.205	0.005	0.000	0.05	13.769	27.395	0.4	496	0.7	SURCHARGED

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
22.003	69	960 minute 1 year Summer I+0%	960	77.000	76.111	0.011	0.000	0.02	14.844	50.947	0.9	425	0.9	SURCHARGED
22.004	57	960 minute 1 year Summer I+0%	960	75.750	74.949	0.099	0.000	0.05	15.935	78.849	0.8	520	1.3	SURCHARGED
22.005	71	960 minute 1 year Summer I+0%	960	75.250	74.441	0.091	0.000	0.05	14.994	106.752	1.1	484	1.8	SURCHARGED
21.002	64	1440 minute 1 year Summer I+0%	1440	74.820	73.641	0.141	0.000	0.05	21.999	165.638	1.6	579	2.4	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	12	Number of Storage Structures	15	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
21.000	65	60 minute 30 year Summer I+0%	60	76.500	75.189	-0.111	0.000	0.15	0.039	5.983	1.7		6.2	OK
21.001	63	60 minute 30 year Summer I+0%	60	75.280	74.022	-0.058	0.000	0.69	0.106	15.484	1.4		15.3	OK
22.000	67	60 minute 30 year Summer I+0%	60	78.150	76.906	-0.094	0.000	0.29	0.058	4.927	0.9		5.0	OK
22.001	68	60 minute 30 year Summer I+0%	60	78.000	76.581	-0.106	0.000	0.19	0.064	4.927	1.2		5.0	OK
22.002	56	480 minute 30 year Winter I+0%	480	77.100	76.337	0.137	0.000	0.06	44.291	58.196	0.4	618	0.7	SURCHARGED

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
22.003	69	600 minute 30 year Winter I+0%	600	77.000	76.230	0.130	0.000	0.03	42.885	107.012	1.0	781	1.2	SURCHARGED
22.004	57	720 minute 30 year Winter I+0%	720	75.750	75.139	0.289	0.000	0.07	49.212	186.273	0.9	776	1.8	SURCHARGED
22.005	71	600 minute 30 year Winter I+0%	600	75.250	74.627	0.277	0.000	0.07	46.740	221.707	1.2	663	2.5	SURCHARGED
21.002	64	720 minute 30 year Winter I+0%	720	74.820	73.865	0.365	0.000	0.07	67.927	342.805	1.8	768	3.2	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	12	Number of Storage Structures	15	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
21.000	65	60 minute 100 year Summer I+40%	60	76.500	75.208	-0.092	0.000	0.32	0.060	12.389	2.1		12.8	OK
21.001	63	60 minute 100 year Summer I+40%	60	75.280	74.779	0.699	0.000	1.27	1.175	31.934	1.6		28.2	SURCHARGED
22.000	67	600 minute 100 year Winter I+40%	600	78.150	77.104	0.104	0.000	0.06	0.282	15.307	0.6		1.1	SURCHARGED
22.001	68	600 minute 100 year Winter I+40%	600	78.000	77.103	0.416	0.000	0.04	1.154	15.307	0.8		1.1	SURCHARGED
22.002	56	600 minute 100 year Winter I+40%	600	77.100	77.103	0.903	2.501	0.14	91.775	85.565	0.4	1144	1.7	FLOOD

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
22.003	69	480 minute 100 year Winter I+40%	480	77.000	76.963	0.863	0.000	0.06	89.232	152.838	1.3	1189	2.3	FLOOD RISK
22.004	57	960 minute 100 year Winter I+40%	960	75.750	75.428	0.578	0.000	0.08	119.190	384.986	0.9	1411	2.1	SURCHARGED
22.005	71	600 minute 100 year Winter I+40%	600	75.250	74.848	0.498	0.000	0.08	101.440	303.511	1.2	1189	3.1	SURCHARGED
21.002	64	720 minute 100 year Winter I+40%	720	74.820	74.175	0.675	0.000	0.08	146.762	676.568	1.9	1299	4.1	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.436 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
21.000	65	15 minute 1 year Summer I+0%	15	76.500	75.183	-0.117	0.000	0.11	0.031	1.356	1.5		4.4	OK
21.001	63	15 minute 1 year Summer I+0%	15	75.280	73.994	-0.086	0.000	0.36	0.072	3.508	1.2		7.9	OK
22.000	67	15 minute 1 year Summer I+0%	15	78.150	76.896	-0.104	0.000	0.20	0.047	1.116	0.8		3.5	OK
22.001	68	15 minute 1 year Summer I+0%	15	78.000	76.573	-0.114	0.000	0.12	0.051	1.116	1.1		3.3	OK
22.002	56	30 minute 1 year Winter I+0%	30	77.100	76.158	-0.042	0.000	0.06	6.712	7.628	0.4	98	0.7	OK
22.003	69	30 minute 1 year Winter I+0%	30	77.000	76.051	-0.049	0.000	0.02	5.949	13.819	0.9	263	0.7	OK
22.004	57	30 minute 1 year Winter I+0%	30	75.750	74.856	0.006	0.000	0.04	6.323	20.924	0.7	206	1.0	SURCHARGED
22.005	71	30 minute 1 year Winter I+0%	30	75.250	74.355	0.005	0.000	0.04	6.267	28.029	1.0	160	1.4	SURCHARGED
21.002	64	30 minute 1 year Summer I+0%	30	74.820	73.524	0.024	0.000	0.04	7.983	37.132	1.5	183	1.8	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.436 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
21.000	65	15 minute 30 year Summer I+0%	15	76.500	75.202	-0.098	0.000	0.26	0.053	3.328	2.0		10.7	OK
21.001	63	15 minute 30 year Summer I+0%	15	75.280	74.109	0.029	0.000	1.00	0.226	8.612	1.4		22.2	SURCHARGED
22.000	67	15 minute 30 year Summer I+0%	15	78.150	76.926	-0.074	0.000	0.50	0.080	2.740	1.0		8.5	OK
22.001	68	15 minute 30 year Summer I+0%	15	78.000	76.596	-0.091	0.000	0.31	0.089	2.740	1.4		8.3	OK
22.002	56	30 minute 30 year Summer I+0%	30	77.100	76.253	0.053	0.000	0.06	23.385	24.677	0.4	322	0.7	SURCHARGED
22.003	69	30 minute 30 year Summer I+0%	30	77.000	76.139	0.039	0.000	0.02	20.549	44.811	0.9	496	0.9	SURCHARGED
22.004	57	30 minute 30 year Summer I+0%	30	75.750	75.004	0.154	0.000	0.06	23.666	67.989	0.8	460	1.4	SURCHARGED
22.005	71	30 minute 30 year Summer I+0%	30	75.250	74.502	0.152	0.000	0.06	23.564	91.533	1.1	383	2.0	SURCHARGED
21.002	64	30 minute 30 year Winter I+0%	30	74.820	73.702	0.202	0.000	0.05	31.942	123.094	1.7	457	2.6	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 12 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.436 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
21.000	65	15 minute 100 year Summer I+40%	15	76.500	75.223	-0.077	0.000	0.48	0.077	6.053	2.3		19.5	OK
21.001	63	15 minute 100 year Summer I+40%	15	75.280	75.032	0.952	0.000	1.50	1.536	15.662	1.9		33.4	FLOOD RISK
22.000	67	15 minute 100 year Summer I+40%	15	78.150	76.964	-0.036	0.000	0.90	0.123	4.983	1.1		15.5	OK
22.001	68	15 minute 100 year Summer I+40%	15	78.000	76.620	-0.067	0.000	0.57	0.129	4.983	1.6		15.2	OK
22.002	56	30 minute 100 year Winter I+40%	30	77.100	76.348	0.148	0.000	0.06	47.072	36.357	0.4	603	0.7	SURCHARGED
22.003	69	30 minute 100 year Summer I+40%	30	77.000	76.224	0.124	0.000	0.03	41.296	61.391	1.0	818	1.2	SURCHARGED
22.004	57	30 minute 100 year Summer I+40%	30	75.750	75.136	0.286	0.000	0.07	48.436	92.791	0.9	753	1.7	SURCHARGED
22.005	71	30 minute 100 year Summer I+40%	30	75.250	74.634	0.284	0.000	0.07	48.287	128.091	1.2	635	2.5	SURCHARGED
21.002	64	30 minute 100 year Winter I+40%	30	74.820	73.857	0.357	0.000	0.07	65.982	170.939	1.8	766	3.2	SURCHARGED

Phase 3 Car Park

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	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	20.000	Volumetric Runoff Coeff.	1.000	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.400	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	120	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.346	4-8	0.094

Total Area Contributing (ha) = 0.440

Total Pipe Volume (m³) = 1.643

Online Controls for Storm

Orifice Manhole: 2, DS/PN: 1.001, Volume (m³): 1.6

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 78.430

Orifice Manhole: 3, DS/PN: 1.002, Volume (m³): 2.2

Diameter (m) 0.042 Discharge Coefficient 0.600 Invert Level (m) 76.890

Orifice Manhole: 3, DS/PN: 1.003, Volume (m³): 2.1

Diameter (m) 0.041 Discharge Coefficient 0.600 Invert Level (m) 76.700

Storage Structures for Storm

Porous Car Park Manhole: 2, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	47.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	78.430	Depression Storage (mm)	5
Max Percolation (l/s)	481.8	Width (m)	30.7	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	56.5	Cap Volume Depth (m)	0.500

Porous Car Park Manhole: 3, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	70.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	76.890	Depression Storage (mm)	5
Max Percolation (l/s)	257.2	Width (m)	31.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	29.3	Cap Volume Depth (m)	0.500

Porous Car Park Manhole: 3, DS/PN: 1.003

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	70.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	76.700	Depression Storage (mm)	5
Max Percolation (l/s)	514.4	Width (m)	31.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	58.6	Cap Volume Depth (m)	0.500

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	3	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	60 minute 1 year Summer I+0%	60	80.850	79.500	-0.100	0.000	0.00	0.000	0.000	0.0		0.0	OK
1.001	2	1440 minute 1 year Summer I+0%	1440	79.780	78.747	0.167	0.000	0.02	22.102	44.467	0.8	602	0.6	SURCHARGED
1.002	3	600 minute 1 year Summer I+0%	600	78.240	77.087	0.047	0.000	0.13	13.153	59.789	0.5	295	1.5	SURCHARGED
1.003	3	1440 minute 1 year Summer I+0%	1440	78.000	76.948	0.098	0.000	0.05	21.277	113.378	1.0	577	1.7	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s) Summer and Winter
Duration(s) (mins) 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	60 minute 30 year Summer I+0%	60	80.850	79.500	-0.100	0.000	0.00	0.000	0.000	0.0		0.0	OK
1.001	2	720 minute 30 year Winter I+0%	720	79.780	78.998	0.418	0.000	0.02	69.402	93.380	0.8	797	0.8	SURCHARGED
1.002	3	480 minute 30 year Winter I+0%	480	78.240	77.279	0.239	0.000	0.13	50.699	94.001	0.5	634	1.5	SURCHARGED
1.003	3	720 minute 30 year Winter I+0%	720	78.000	77.108	0.258	0.000	0.07	56.294	238.505	1.1	841	2.2	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	3	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.283
FEH Rainfall Version	1999	E (1km)	0.322
Site Location	GB 522900 211350 TL 22900 11350	F (1km)	2.471
C (1km)	-0.028	Cv (Summer)	1.000
D1 (1km)	0.305	Cv (Winter)	1.000
D2 (1km)	0.291		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	60 minute 100 year Summer I+40%	60	80.850	79.500	-0.100	0.000	0.00	0.000	0.000	0.0		0.0	OK
1.001	2	720 minute 100 year Winter I+40%	720	79.780	79.378	0.798	0.000	0.03	152.185	185.525	0.9	1357	1.1	SURCHARGED
1.002	3	720 minute 100 year Winter I+40%	720	78.240	77.554	0.514	0.000	0.15	118.304	332.188	0.5	1363	1.8	SURCHARGED
1.003	3	720 minute 100 year Winter I+40%	720	78.000	77.307	0.457	0.000	0.09	119.745	474.223	1.1	1342	2.7	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.434 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	15 minute 1 year Summer I+0%	15	80.850	79.500	-0.100	0.000	0.00	0.000	0.000	0.0		0.0	OK
1.001	2	30 minute 1 year Winter I+0%	30	79.780	78.619	0.039	0.000	0.01	7.929	8.974	0.7	164	0.5	SURCHARGED
1.002	3	30 minute 1 year Winter I+0%	30	78.240	77.042	0.002	0.000	0.11	7.816	18.093	0.5	90	1.3	SURCHARGED
1.003	3	30 minute 1 year Winter I+0%	30	78.000	76.822	-0.028	0.000	0.04	5.226	22.582	0.9	169	1.1	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.434 Cv (Winter) 1.000

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

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

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	15 minute 30 year Summer I+0%	15	80.850	79.500	-0.100	0.000	0.00	0.000	0.000	0.0		0.0	OK
1.001	2	30 minute 30 year Summer I+0%	30	79.780	78.815	0.235	0.000	0.02	32.564	34.433	0.8	447	0.7	SURCHARGED
1.002	3	30 minute 30 year Summer I+0%	30	78.240	77.173	0.133	0.000	0.14	27.030	63.303	0.5	267	1.7	SURCHARGED
1.003	3	30 minute 30 year Winter I+0%	30	78.000	76.964	0.114	0.000	0.06	23.906	87.448	1.0	616	1.7	SURCHARGED

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

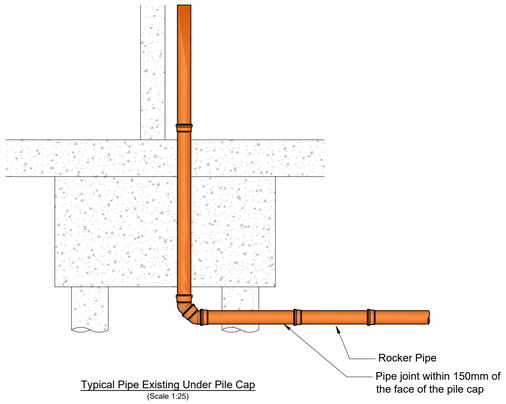
Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.434 Cv (Winter) 1.000

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

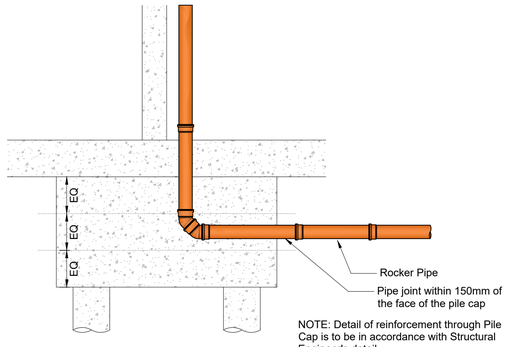
Profile(s) Summer and Winter
Duration(s) (mins) 15, 30
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	15 minute 100 year Summer I+40%	15	80.850	79.500	-0.100	0.000	0.00	0.000	0.000	0.0		0.0	OK
1.001	2	30 minute 100 year Summer I+40%	30	79.780	78.990	0.410	0.000	0.02	67.737	50.809	0.8	763	0.8	SURCHARGED
1.002	3	30 minute 100 year Summer I+40%	30	78.240	77.294	0.254	0.000	0.14	54.705	101.168	0.5	595	1.7	SURCHARGED
1.003	3	30 minute 100 year Summer I+40%	30	78.000	77.089	0.239	0.000	0.07	51.243	135.223	1.1	895	2.1	SURCHARGED

Appendix D Standard Details Drawings

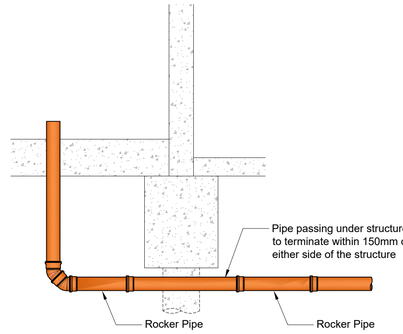


Typical Pipe Existing Under Pile Cap
(Scale 1:25)

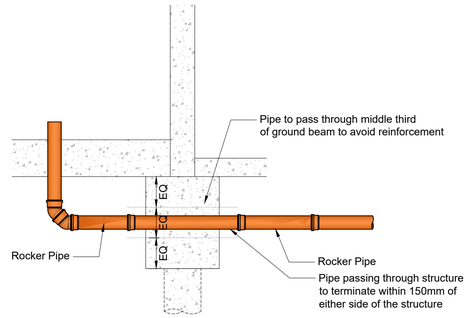


NOTE: Detail of reinforcement through Pile Cap is to be in accordance with Structural Engineer's detail.

Typical Pipe Existing Through Pile Cap
(Scale 1:25)

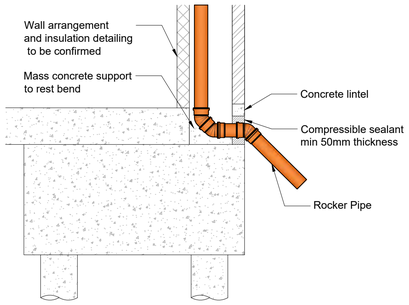


Typical Pipe Passing Under Ground Beam
(Scale 1:25)

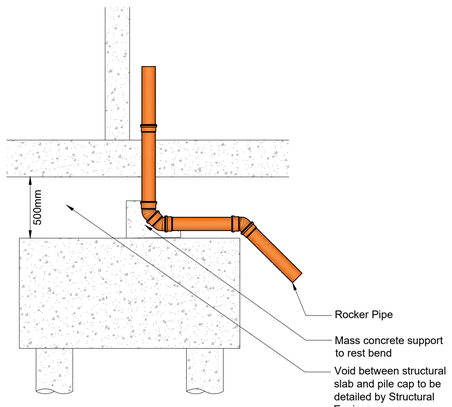


NOTE: Detail of reinforcement through Pile Cap is to be in accordance with Structural Engineer's detail.

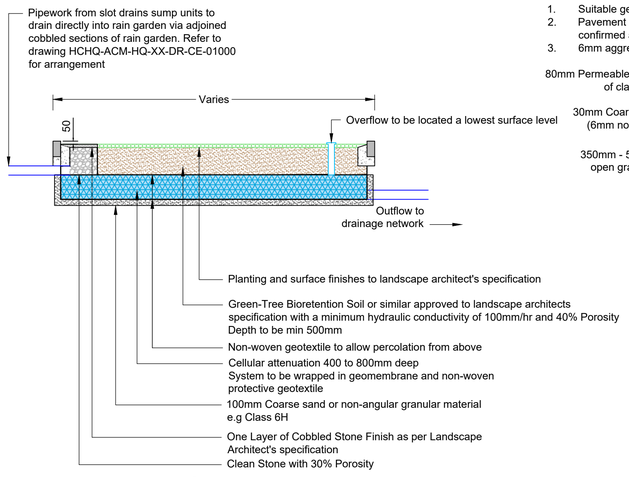
Typical Pipe Passing Through Ground Beam
(Scale 1:25)



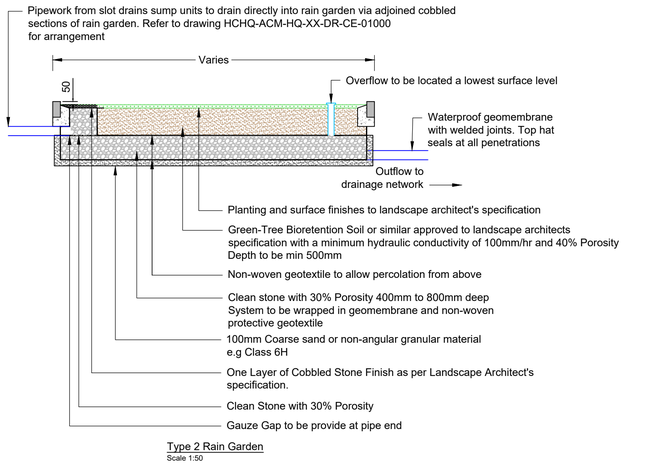
Typical Rain Water Pipe Over Pile Cap
(Scale 1:25)



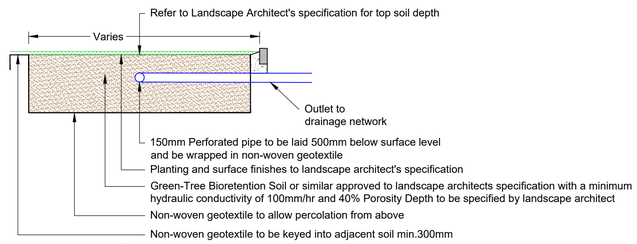
Typical Pipe Over Lowered Pile Cap
(Scale 1:25)



Type 1 Rain Garden
Scale 1:50



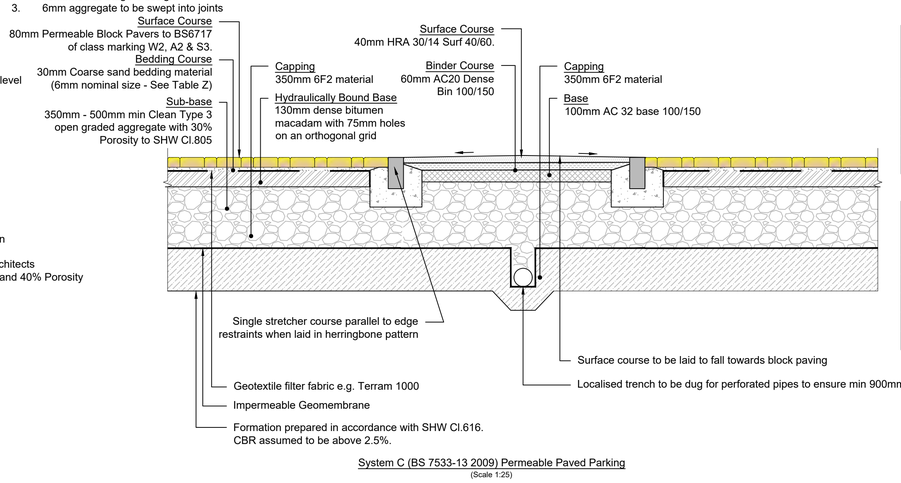
Type 2 Rain Garden
Scale 1:50



Type 3 Rain Garden
Scale 1:50

NOTES

1. Suitable geotextile to be installed in accordance with manufacturer's recommendations.
2. Pavement sub-base to contain baffle walls to increase storage volume. Baffle wall design to be confirmed at Stage 4 design.
3. 6mm aggregate to be swept into joints



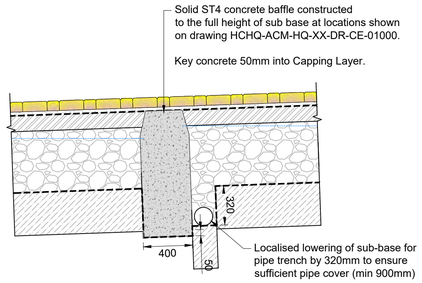
System C (BS 7533-13 2009) Permeable Paved Parking
(Scale 1:25)

Table 1 - Total capping thickness for low CBR (Lined permeable paving)

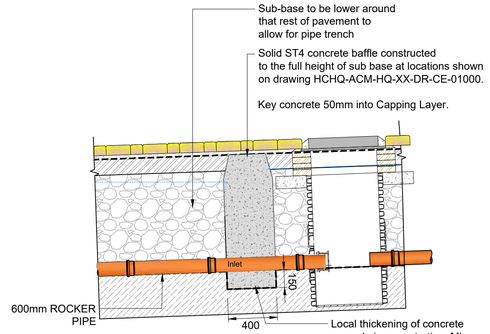
CBR (%)	Adjusted Capping Thickness (Total)
1	600
2	350
3	250
4	200
5+	150

Table 2 - Total capping thickness for low CBR (Lined permeable paving)

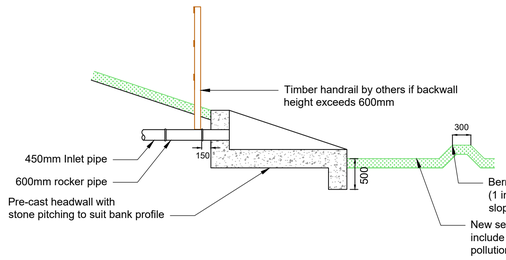
CBR (%)	Adjusted Capping Thickness (Total)
1	600
2	350
3	250
4	200
5+	150



System C Permeable Paving Check Dam
(Scale 1:25)



System C Permeable Paving Check Dam Pipe Crossing
(Scale 1:25)



Althon Headwall H3C Section A-A
Scale 1:25

Project Management Initials: Designer: __MT__ Checked: __AR__ Approved: __TCR__ ISO A1 594mm x 841mm

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AECOM

PROJECT

HCHQ REDEVELOPMENT

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NOTES

1. Do not scale from the drawing
2. All levels shown are in meters Above Ordnance Datum (AOD) unless stated otherwise
3. All proprietary component are to be installed to the manufacturers specifications. This includes foul pumps, geocellular storage, slot drain etc

ISSUE/REVISION

Rev	Date	Detail	Made	Chk'd	App'd
P02	26.08.22	Updated Stage 3 First Issue	AR	TCR	TCR
P01	25.01.21	First Issue	MT	AR	TCR

KEY PLAN

PROJECT NUMBER

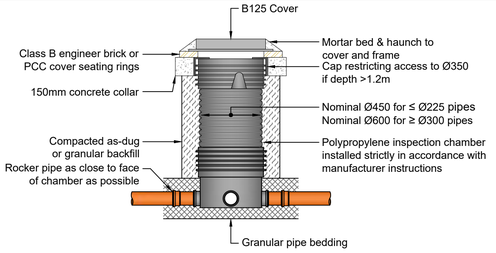
60600329

SHEET TITLE

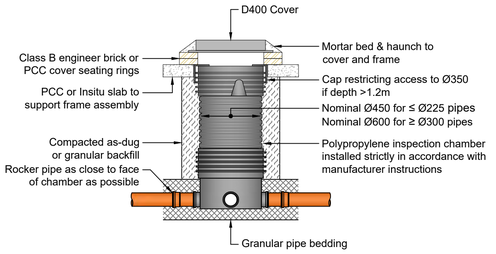
Atrium Drainage Construction Details Sheet 2

SHEET NUMBER

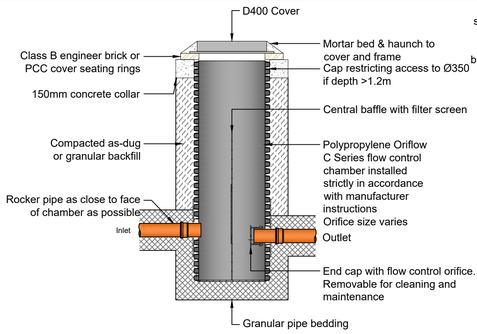
HCHQ-ACM-HQ-XX-DR-CE-06001



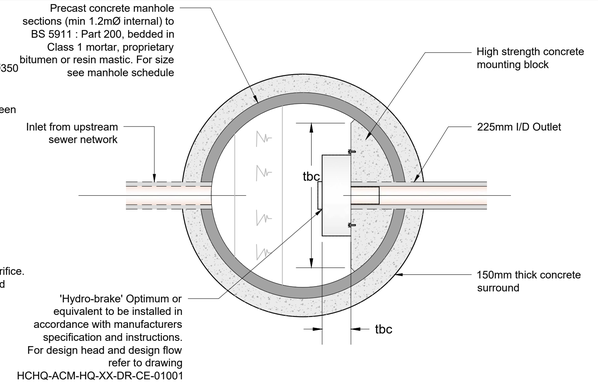
Large Inspection Chamber
B125 Loading - Pedestrian Areas
(Scale 1:25)

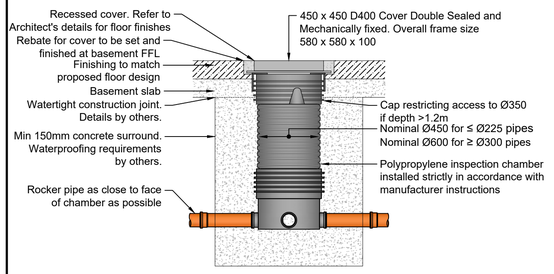


Large Inspection Chamber
D400 Loading - Shared Drives
(Scale 1:25)

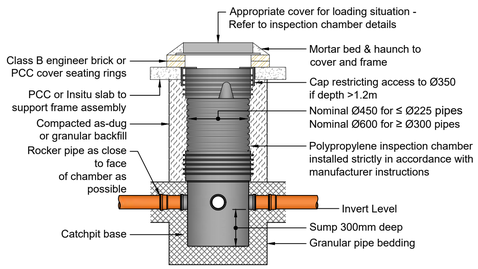


Oriflow C Series Flow Control Chamber
C250 Loading - Vehicular Areas
(Scale 1:25)

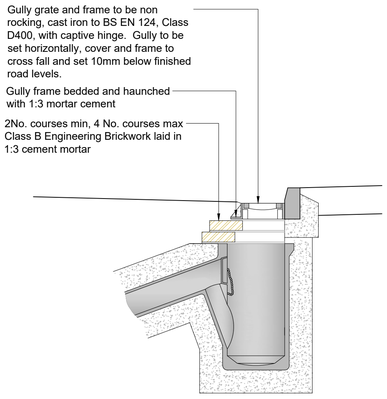




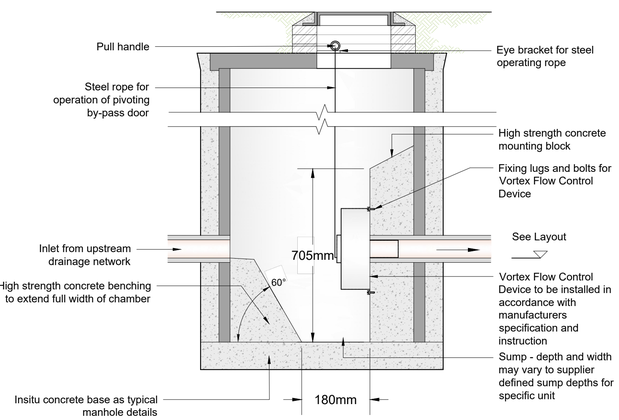
Internal Inspection Chamber
D400 Loading in basement slab
(Scale 1:25)

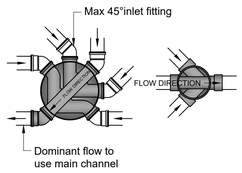


PPIC Catchpit
(Scale 1:25)

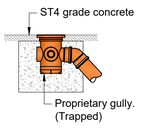


Road Gully Detail
(Scale 1:25)



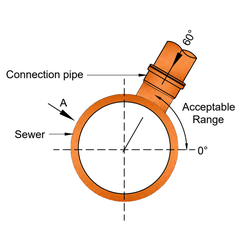


Pipe Entry Configuration
(Scale 1:25)

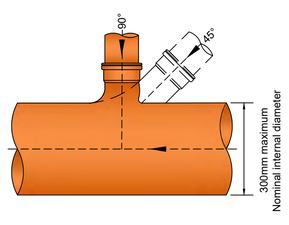


Yard Gully
(Scale 1:25)

PIPE DIAMETER	ROCKER PIPE LENGTH
150 - 600	600mm
675 - 750	1000mm
>750	1250mm

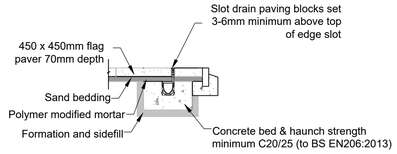


Cross-Sectional View of Sewer

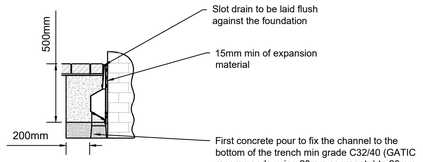


Plan Viewed in Direction of Arrow - A

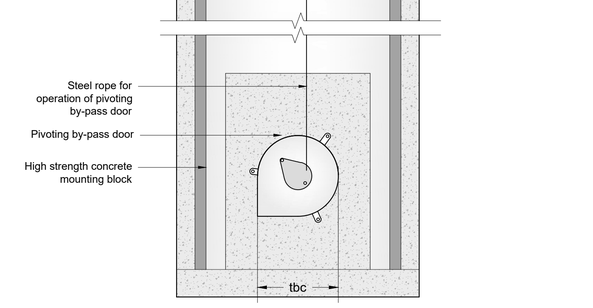
Connection To Sewer
(Scale 1:10)



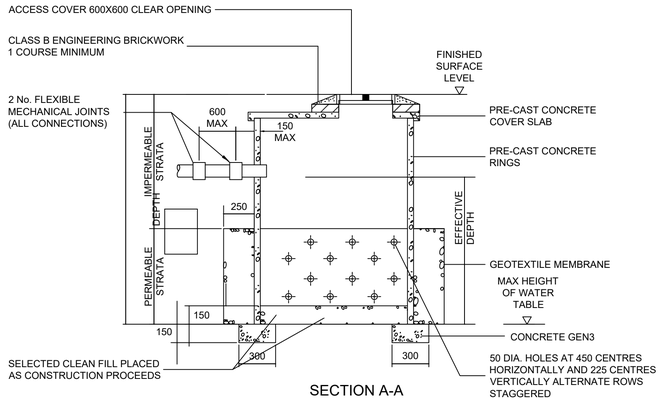
ACO MultiDrain Linear Drainage Channel
(Scale 1:25)



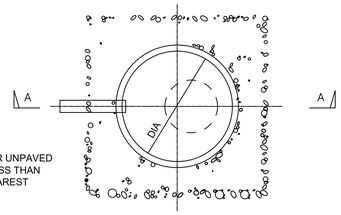
Gatic 115mm Facade Drain Detail
(Scale 1:25)



Hydrobrake Flow Control Chamber
(Scale 1:25)

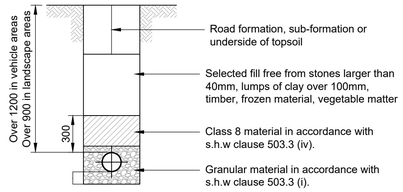


SECTION A-A



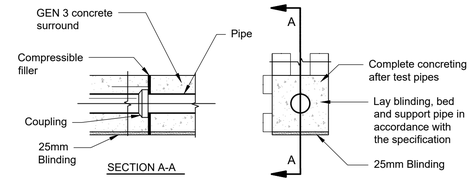
PLAN

Concrete Ring Soakaway
scale 1:25



PIPE BEDDING CLASS S

Notes:
1. Bedding beneath and at the sides of class B and S pipes to be well compacted. The first 300mm of fill above the crown of the pipe is to be lightly tamped by hand. mechanical compaction may be used only above this level. geotextiles may be used where directed or approved by the engineer to contain bedding material in certain soils e.g. running sand in very wet conditions, where directed or approved by the engineer a temporary land drain may be laid within the granular bed.



PIPE BEDDING CLASS Z

General pipe bedding notes:
1. Buried pipelines should be designed in accordance with BS EN 1295-1.
2. The design of the pipeline should take account of loading from the passage of construction plant as well as normal design loading.
3. If the depth of cover to the crown of the pipe is less than 1.2m in vehicular areas or 0.9m in non-vehicular areas, one of the following protection measures should be provided (unless it can be demonstrated by structural calculations or other suitable means):
   3.1. a concrete slab in accordance with the 'protection for pipes laid at shallow depths' detail; or
   3.2. a concrete surround with flexible joints in accordance with the 'bedding class z' detail.
4. Flexible joints shall be provided in concrete, by inserting compressible board at intervals not exceeding 5000mm precut to diameter, height and width equal to the concrete cross section.
5. Concrete cover must have flexible joints at pipe joints.

AECOM

PROJECT

HCHQ REDEVELOPMENT

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NOTES

1. Do not scale from the drawing
2. All levels shown are in meters Above Ordnance Datum (AOD) unless stated otherwise
3. All proprietary component are to be installed to the manufacturers specifications. This includes foul pumps, geocellular storage, slot drain etc

ISSUE/REVISION

Rev	Date	Detail	Made	Chk'd	App'd
P02	26.08.22	Updated Stage 3 First Issue	AR	TCR	TCR
P01	20.12.21	First Issue	MT	AR	TCR

KEY PLAN

PROJECT NUMBER

60600329

SHEET TITLE

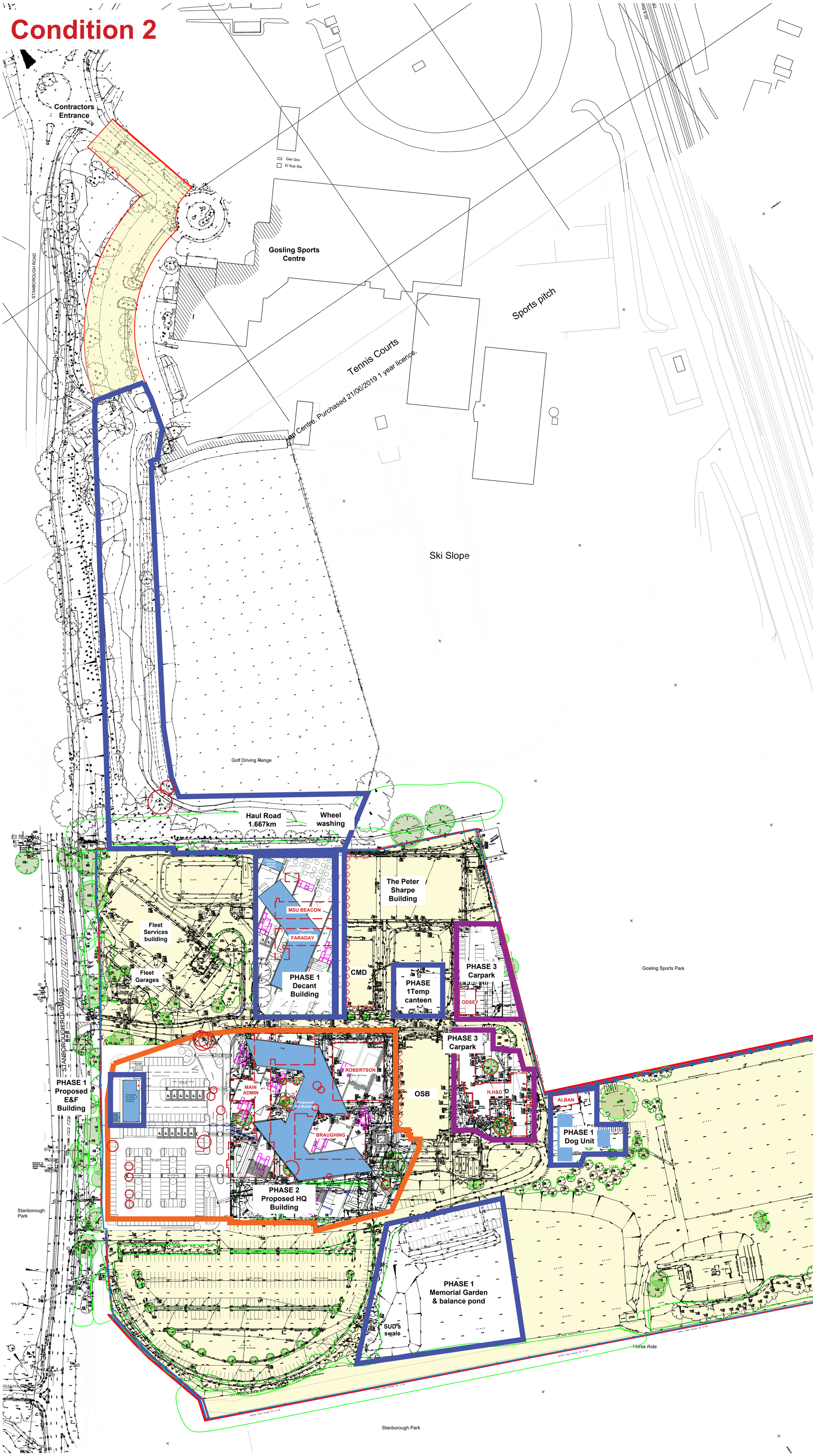
Atrium Drainage Construction Details Sheet 1

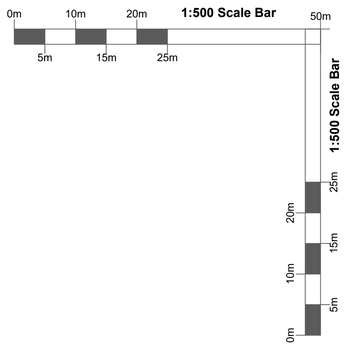
SHEET NUMBER

HCHQ-ACM-HQ-XX-DR-CE-06000

Appendix E Phasing Plan

Condition 2





PHASE 1

1. Haul Road works
2. Proposed Memorial Garden & SUDs balance pond
3. Removal of Alban temp. & Proposed Dog Training Centre & kennels
4. E&F Building
5. Decant Building & associated landscaping
6. Temp canteen (Phase 1&2 only)

PHASE 2

7. Demolition of Main Admin building, Robertson & Braughing. Proposed HQ building, carpark and associated landscaping

PHASE 3

8. Remove temp. canteen
9. Demolition of H,H&D building, proposed car park
10. Removal of Odsey temp. Alter carpark layout

Trees to be removed

Buildings to be demolished

Dust deposition

Pollution/ spillage

Noise

Vibration

Lighting

Protection to building facades from noise and dust

Secure line between police and construction site

Refer to Contractors CEMP for detail

PL01	For Discharge of Planning Conditions	22/08/22	CB
REV		DATE	BY

HERTFORDSHIRE CONSTABULARY, HEADQUARTERS REDEVELOPMENT, STANBOROUGH

Proposed Site Plan
Areas Affected by the CEMP
CONDITION 2

VGA PROJECT NUMBER		L&L
7645		
DRAWING REFERENCE		REV
HCHQ-VGA-	BBB	PL01

DRAWN / DATE	CHECKED / DATE	SCALE
CB AUG 22	MC AUG 22	1:750 at A0

PLANNING CONDITION 2

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0mm A0 ORIGINAL SCALE 50mm A0 ORIGINAL SCALE 100mm

26/08/2022 - 13:06:01

FILE PATH = Y:\7645 Project Phoenix New Police Headquarters\2-VGA Drawings\2f-Issued Drawings\Issue_263_260822 Planning condition drawings- sent to WD + AECOM\Condition 2_BBB_Areas of construction affected by the CEMP.dwg / BBB