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	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.400	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	32.170	0.700	46.0	0.097	5.00	0.0	0.600	o	150	
1.001	9.324	0.300	31.1	0.076	0.00	0.0	0.600	o	225	
1.002	22.976	0.500	46.0	0.016	0.00	0.0	0.600	o	300	
1.003	8.438	0.030	281.3	0.046	0.00	0.0	0.600	o	750	
2.000	15.000	0.105	142.9	0.088	5.00	0.0	0.600	o	225	
1.004	8.105	0.030	270.2	0.049	0.00	0.0	0.600	o	750	
1.005	7.264	0.025	290.6	0.020	0.00	0.0	0.600	o	750	
3.000	15.000	0.110	136.4	0.128	5.00	0.0	0.600	o	225	
1.006	30.110	0.100	301.1	0.000	0.00	0.0	0.600	o	750	
1.007	6.962	0.045	154.7	0.016	0.00	0.0	0.600	o	375	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.36	69.800	0.097	0.0	0.0	0.0	1.49	26.3	13.1
1.001	50.00	5.43	69.025	0.173	0.0	0.0	0.0	2.36	93.6	23.4
1.002	50.00	5.59	68.650	0.189	0.0	0.0	0.0	2.33	164.4	25.6
1.003	50.00	5.68	67.700	0.235	0.0	0.0	0.0	1.66	735.0	31.8
2.000	50.00	5.23	68.300	0.088	0.0	0.0	0.0	1.09	43.4	11.9
1.004	50.00	5.76	67.670	0.372	0.0	0.0	0.0	1.70	750.0	50.4
1.005	50.00	5.83	67.640	0.392	0.0	0.0	0.0	1.64	723.0	53.1
3.000	50.00	5.22	68.250	0.128	0.0	0.0	0.0	1.12	44.4	17.3
1.006	50.00	6.14	67.615	0.520	0.0	0.0	0.0	1.61	710.2	70.4
1.007	50.00	6.22	67.515	0.536	0.0	0.0	0.0	1.45	160.6	72.6

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.409		

Online Controls for Storm

Complex Manhole: 8, DS/PN: 1.007, Volume (m³): 19.6

Hydro-Brake Optimum®

Unit Reference	MD-SFP-0099-5200-1350-5200
Design Head (m)	1.350
Design Flow (l/s)	5.2
Flush-Flo™	Calculated
Objective	Future Proof
Diameter (mm)	99
Invert Level (m)	67.515
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	5.2	Kick-Flo®	0.772	4.0
Flush-Flo™	0.351	5.1	Mean Flow over Head Range	-	4.5

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.4	1.200	4.9	3.000	7.5	7.000	11.2
0.200	4.9	1.400	5.2	3.500	8.0	7.500	11.5
0.300	5.1	1.600	5.6	4.000	8.6	8.000	11.9
0.400	5.1	1.800	5.9	4.500	9.0	8.500	12.2
0.500	5.0	2.000	6.2	5.000	9.5	9.000	12.6
0.600	4.8	2.200	6.5	5.500	10.0	9.500	12.9
0.800	4.0	2.400	6.7	6.000	10.4		
1.000	4.5	2.600	7.0	6.500	10.8		

Weir

Discharge Coef 0.544 Width (m) 1.500 Invert Level (m) 68.865

Storage Structures for Storm

Cellular Storage Manhole: Tank1, DS/PN: 2.000

Invert Level (m) 68.300 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	40.0	0.800	40.0	60.2

Cellular Storage Manhole: Tank2, DS/PN: 3.000

Invert Level (m) 68.250 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	60.0	60.0	0.800	60.0	84.8

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.409
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	10, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	10	+0%	30/15 Summer	100/15 Winter			69.948
1.001	2	15 Winter	10	+0%	100/15 Summer				69.153
1.002	3	120 Winter	10	+0%	100/15 Summer				68.846
1.003	4	120 Winter	10	+0%	10/15 Summer				68.844
2.000	Tank1	120 Winter	10	+0%	10/15 Winter				68.845
1.004	5	120 Winter	10	+0%	10/15 Summer				68.843
1.005	6	120 Winter	10	+0%	10/15 Summer				68.843
3.000	Tank2	120 Winter	10	+0%	10/15 Summer				68.845
1.006	7	120 Winter	10	+0%	10/15 Summer				68.843
1.007	8	120 Winter	10	+0%	10/15 Summer				68.842

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.002	0.000	1.00		25.3	OK	1
1.001	2	-0.097	0.000	0.61		47.0	OK	
1.002	3	-0.104	0.000	0.11		16.0	OK	
1.003	4	0.394	0.000	0.05		19.5	SURCHARGED	
2.000	Tank1	0.320	0.000	0.15		5.8	SURCHARGED	
1.004	5	0.423	0.000	0.05		20.2	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	6	0.453	0.000	0.06		21.7	SURCHARGED	
3.000	Tank2	0.370	0.000	0.19		7.6	SURCHARGED	
1.006	7	0.478	0.000	0.03		16.2	SURCHARGED	
1.007	8	0.952	0.000	0.05		5.1	SURCHARGED	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 6008-SW NW1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.900
Ratio R	0.400	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	0	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for 6008-SW NW1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	55.887	0.725	77.1	0.071	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	30.906	0.700	44.2	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	26.435	0.165	160.2	0.120	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	5.905	0.060	98.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	31.337	0.200	156.7	0.045	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	25.552	0.225	113.6	0.063	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	10.449	0.150	69.7	0.019	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	30.364	0.100	303.6	0.052	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.006	15.602	0.050	312.0	0.037	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.007	29.901	0.100	299.0	0.073	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	5.81	71.400	0.071	0.0	0.0	0.0	1.15	20.3	0.0
1.001	0.00	6.07	70.600	0.118	0.0	0.0	0.0	1.97	78.5	0.0
2.000	0.00	5.43	70.200	0.120	0.0	0.0	0.0	1.03	41.0	0.0
2.001	0.00	5.52	70.035	0.120	0.0	0.0	0.0	1.01	17.9	0.0
1.002	0.00	6.49	69.825	0.283	0.0	0.0	0.0	1.25	88.6	0.0
1.003	0.00	6.78	69.625	0.346	0.0	0.0	0.0	1.47	104.2	0.0
1.004	0.00	6.87	69.400	0.365	0.0	0.0	0.0	1.89	133.3	0.0
1.005	0.00	7.19	68.800	0.417	0.0	0.0	0.0	1.60	707.2	0.0
1.006	0.00	7.35	68.700	0.454	0.0	0.0	0.0	1.58	697.5	0.0
1.007	0.00	7.66	68.650	0.527	0.0	0.0	0.0	1.61	712.7	0.0

Network Design Table for 6008-SW NW1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.008	7.436	0.329	22.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.008	0.00	7.70	68.550	0.527	0.0	0.0	0.0	3.32	234.8	0.0

PIPELINE SCHEDULES for 6008-SW NW1.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	72.940	71.400	1.390	Open Manhole	1200
1.001	o	225	2	73.358	70.600	2.533	Open Manhole	1200
2.000	o	225	11	72.150	70.200	1.725	Open Manhole	1200
2.001	o	150	12	72.160	70.035	1.975	Open Manhole	1200
1.002	o	300	3	72.762	69.825	2.637	Open Manhole	1200
1.003	o	300	4	71.978	69.625	2.053	Open Manhole	1200
1.004	o	300	5	71.429	69.400	1.729	Open Manhole	1200
1.005	o	750	6	71.429	68.800	1.879	Open Manhole	1800
1.006	o	750	7	71.527	68.700	2.077	Open Manhole	1800
1.007	o	750	8	71.325	68.650	1.925	Open Manhole	1800
1.008	o	300	9	71.000	68.550	2.150	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	55.887	77.1	2	73.358	70.675	2.533	Open Manhole	1200
1.001	30.906	44.2	3	72.762	69.900	2.637	Open Manhole	1200
2.000	26.435	160.2	12	72.160	70.035	1.900	Open Manhole	1200
2.001	5.905	98.4	3	72.762	69.975	2.637	Open Manhole	1200
1.002	31.337	156.7	4	71.978	69.625	2.053	Open Manhole	1200
1.003	25.552	113.6	5	71.429	69.400	1.729	Open Manhole	1200
1.004	10.449	69.7	6	71.429	69.250	1.879	Open Manhole	1800
1.005	30.364	303.6	7	71.527	68.700	2.077	Open Manhole	1800
1.006	15.602	312.0	8	71.325	68.650	1.925	Open Manhole	1800
1.007	29.901	299.0	9	71.000	68.550	1.700	Open Manhole	1800
1.008	7.436	22.6	10	70.883	68.221	2.362	Open Manhole	1500

Free Flowing Outfall Details for 6008-SW NW1.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	10	70.883	68.221	68.071	1500	0

Simulation Criteria for 6008-SW NW1.SWS

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for 6008-SW NW1.SWS

Orifice Manhole: 12, DS/PN: 2.001, Volume (m³): 3.4

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 70.035

Complex Manhole: 9, DS/PN: 1.008, Volume (m³): 18.6

Hydro-Brake Optimum®

Unit Reference	MD-SHE-0157-1300-1500-1300
Design Head (m)	1.500
Design Flow (l/s)	13.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	157
Invert Level (m)	68.550
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	13.0
Flush-Flo™	0.443	13.0
Kick-Flo®	0.950	10.5
Mean Flow over Head Range	-	11.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.6	1.200	11.7	3.000	18.1	7.000	27.1
0.200	11.7	1.400	12.6	3.500	19.4	7.500	28.0
0.300	12.7	1.600	13.4	4.000	20.7	8.000	28.9
0.400	13.0	1.800	14.2	4.500	21.9	8.500	29.8
0.500	13.0	2.000	14.9	5.000	23.1	9.000	30.6
0.600	12.8	2.200	15.6	5.500	24.1	9.500	31.4
0.800	12.0	2.400	16.2	6.000	25.2		
1.000	10.7	2.600	16.9	6.500	26.2		

Weir

Discharge Coef 0.544 Width (m) 1.500 Invert Level (m) 70.050

Storage Structures for 6008-SW NW1.SWS

Cellular Storage Manhole: 11, DS/PN: 2.000

Invert Level (m) 70.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	88.0	88.0	0.801	0.0	118.0
0.800	88.0	118.0			

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW1.SWS

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 10, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	10	+0%	30/15 Summer	100/15 Winter		
1.001	2	15 Winter	10	+0%	100/15 Summer			
2.000	11	240 Winter	10	+0%	10/60 Winter			
2.001	12	240 Winter	10	+0%	1/15 Summer			
1.002	3	15 Winter	10	+0%	30/30 Winter			
1.003	4	60 Winter	10	+0%	30/15 Winter			
1.004	5	60 Winter	10	+0%	10/30 Winter			
1.005	6	60 Winter	10	+0%	10/30 Winter			
1.006	7	60 Winter	10	+0%	10/15 Winter			
1.007	8	60 Winter	10	+0%	10/15 Winter			
1.008	9	60 Winter	10	+0%	1/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	71.518	-0.032	0.000	0.94		18.6	OK	1

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW1.SWS

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.001	2	70.704	-0.121	0.000	0.42		30.8	OK	
2.000	11	70.485	0.060	0.000	0.07		2.8	SURCHARGED	
2.001	12	70.577	0.392	0.000	0.06		0.9	SURCHARGED	
1.002	3	69.985	-0.140	0.000	0.54		43.5	OK	
1.003	4	69.832	-0.093	0.000	0.34		31.5	OK	
1.004	5	69.824	0.124	0.000	0.35		34.1	SURCHARGED	
1.005	6	69.819	0.269	0.000	0.07		38.6	SURCHARGED	
1.006	7	69.818	0.368	0.000	0.06		26.2	SURCHARGED	
1.007	8	69.816	0.416	0.000	0.05		26.9	SURCHARGED	
1.008	9	69.815	0.965	0.000	0.09		12.7	SURCHARGED	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 6008-SW NW2.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.900
Ratio R	0.400	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	0	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for 6008-SW NW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.207	1.125	9.1	0.028	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	16.027	0.100	160.3	0.092	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	3.824	0.725	5.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	26.574	0.175	151.9	0.089	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	9.366	0.050	187.3	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	26.822	0.090	298.0	0.017	0.00	0.0	0.600	o	750	Pipe/Conduit	
3.000	15.549	0.090	172.8	0.014	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	11.997	0.040	299.9	0.052	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	5.05	71.500	0.028	0.0	0.0	0.0	3.37	59.5	0.0
2.000	0.00	5.26	71.200	0.092	0.0	0.0	0.0	1.03	41.0	0.0
2.001	0.00	5.27	71.100	0.092	0.0	0.0	0.0	4.42	78.1	0.0
1.001	0.00	5.69	70.300	0.209	0.0	0.0	0.0	1.06	42.1	0.0
1.002	0.00	5.83	70.050	0.263	0.0	0.0	0.0	1.15	81.0	0.0
1.003	0.00	6.11	69.550	0.280	0.0	0.0	0.0	1.62	713.8	0.0
3.000	0.00	5.22	70.000	0.014	0.0	0.0	0.0	1.19	84.3	0.0
1.004	0.00	6.23	69.460	0.346	0.0	0.0	0.0	1.61	711.6	0.0

Network Design Table for 6008-SW NW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	19.693	1.090	18.1	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	13.540	0.135	100.3	0.064	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	5.231	0.055	95.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	13.996	0.140	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.002	14.276	0.145	98.5	0.025	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.003	36.737	0.505	72.7	0.039	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	25.912	0.086	300.0	0.072	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.006	18.682	0.064	291.9	0.163	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.007	6.877	1.037	6.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	0.00	5.14	71.900	0.012	0.0	0.0	0.0	2.38	42.1	0.0
5.000	0.00	5.22	71.000	0.064	0.0	0.0	0.0	1.00	17.7	0.0
5.001	0.00	5.31	70.865	0.064	0.0	0.0	0.0	1.03	18.2	0.0
4.001	0.00	5.54	70.810	0.076	0.0	0.0	0.0	1.00	17.8	0.0
4.002	0.00	5.78	70.670	0.101	0.0	0.0	0.0	1.01	17.9	0.0
4.003	0.00	6.18	70.450	0.140	0.0	0.0	0.0	1.54	61.0	0.0
1.005	0.00	6.50	69.420	0.558	0.0	0.0	0.0	1.61	711.5	0.0
1.006	0.00	6.69	69.334	0.721	0.0	0.0	0.0	1.63	721.3	0.0
1.007	0.00	6.71	69.270	0.721	0.0	0.0	0.0	6.14	434.2	0.0

PIPELINE SCHEDULES for 6008-SW NW2.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	13	72.909	71.500	1.259	Open Manhole	1200
2.000	o	225	22	73.000	71.200	1.575	Open Manhole	1200
2.001	o	150	23	73.000	71.100	1.750	Open Manhole	1200
1.001	o	225	14	73.003	70.300	2.478	Open Manhole	1200
1.002	o	300	15	73.141	70.050	2.791	Open Manhole	1200
1.003	o	750	16	73.108	69.550	2.808	Open Manhole	1800
3.000	o	300	24	72.582	70.000	2.282	Open Manhole	1200
1.004	o	750	17	72.872	69.460	2.662	Open Manhole	1800
4.000	o	150	25	73.283	71.900	1.233	Open Manhole	1200
5.000	o	150	29	72.860	71.000	1.710	Open Manhole	1200
5.001	o	150	30	72.867	70.865	1.852	Open Manhole	1200
4.001	o	150	26	73.408	70.810	2.448	Open Manhole	1200
4.002	o	150	27	73.272	70.670	2.452	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	10.207	9.1	14	73.003	70.375	2.478	Open Manhole	1200
2.000	16.027	160.3	23	73.000	71.100	1.675	Open Manhole	1200
2.001	3.824	5.3	14	73.003	70.375	2.478	Open Manhole	1200
1.001	26.574	151.9	15	73.141	70.125	2.791	Open Manhole	1200
1.002	9.366	187.3	16	73.108	70.000	2.808	Open Manhole	1800
1.003	26.822	298.0	17	72.872	69.460	2.662	Open Manhole	1800
3.000	15.549	172.8	17	72.872	69.910	2.662	Open Manhole	1800
1.004	11.997	299.9	18	72.827	69.420	2.657	Open Manhole	1800
4.000	19.693	18.1	26	73.408	70.810	2.448	Open Manhole	1200
5.000	13.540	100.3	30	72.867	70.865	1.852	Open Manhole	1200
5.001	5.231	95.1	26	73.408	70.810	2.448	Open Manhole	1200
4.001	13.996	100.0	27	73.272	70.670	2.452	Open Manhole	1200
4.002	14.276	98.5	28	73.183	70.525	2.508	Open Manhole	1200

PIPELINE SCHEDULES for 6008-SW NW2.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.003	o	225	28	73.183	70.450	2.508	Open Manhole	1200
1.005	o	750	18	72.827	69.420	2.657	Open Manhole	1800
1.006	o	750	19	72.256	69.334	2.172	Open Manhole	1800
1.007	o	300	20	71.416	69.270	1.846	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.003	36.737	72.7	18	72.827	69.945	2.657	Open Manhole	1800
1.005	25.912	300.0	19	72.256	69.334	2.172	Open Manhole	1800
1.006	18.682	291.9	20	71.416	69.270	1.396	Open Manhole	1800
1.007	6.877	6.6	21	71.336	68.233	2.803	Open Manhole	1500

Free Flowing Outfall Details for 6008-SW NW2.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	21	71.336	68.233	68.008	1500	0

Simulation Criteria for 6008-SW NW2.SWS

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Profile Type Summer
Return Period (years)		100	Cv (Summer) 0.750
Region	England and Wales		Cv (Winter) 0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for 6008-SW NW2.SWS

Orifice Manhole: 23, DS/PN: 2.001, Volume (m³): 2.7

Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 71.100

Orifice Manhole: 30, DS/PN: 5.001, Volume (m³): 2.5

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 70.865

Complex Manhole: 20, DS/PN: 1.007, Volume (m³): 12.9

Hydro-Brake Optimum®

Unit Reference	MD-SHE-0126-8300-1500-8300
Design Head (m)	1.500
Design Flow (l/s)	8.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	126
Invert Level (m)	69.270
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	8.3
Flush-Flo™	0.442	8.3
Kick-Flo®	0.926	6.6
Mean Flow over Head Range	-	7.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.5	1.200	7.5	3.000	11.5	7.000	17.2
0.200	7.5	1.400	8.0	3.500	12.4	7.500	17.8
0.300	8.1	1.600	8.6	4.000	13.2	8.000	18.4
0.400	8.3	1.800	9.0	4.500	14.0	8.500	18.9
0.500	8.3	2.000	9.5	5.000	14.7	9.000	19.4
0.600	8.1	2.200	9.9	5.500	15.4	9.500	20.0
0.800	7.6	2.400	10.4	6.000	16.0		
1.000	6.9	2.600	10.8	6.500	16.6		

Weir

Discharge Coef 0.544 Width (m) 1.500 Invert Level (m) 70.770

Storage Structures for 6008-SW NW2.SWS

Cellular Storage Manhole: 22, DS/PN: 2.000

Invert Level (m) 71.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	45.0	45.0	0.801	0.0	66.5
0.800	45.0	66.5			

Cellular Storage Manhole: 24, DS/PN: 3.000

Invert Level (m) 70.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	70.0	70.0	0.801	0.0	96.8
0.800	70.0	96.8			

Cellular Storage Manhole: 29, DS/PN: 5.000

Invert Level (m) 71.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	35.0	35.0	0.801	0.0	53.9
0.800	35.0	53.9			

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW2.SWS

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 10, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	13	15 Winter	10	+0%	100/15 Winter				71.538
2.000	22	120 Winter	10	+0%	10/30 Summer				71.512
2.001	23	120 Winter	10	+0%	1/15 Summer				71.592
1.001	14	120 Winter	10	+0%	10/30 Winter				70.619
1.002	15	120 Winter	10	+0%	10/15 Winter				70.612
1.003	16	120 Winter	10	+0%	10/15 Summer				70.609
3.000	24	120 Winter	10	+0%	10/30 Summer				70.609
1.004	17	120 Winter	10	+0%	10/15 Summer				70.609
4.000	25	15 Winter	10	+0%					71.929
5.000	29	120 Winter	10	+0%	10/15 Summer				71.303
5.001	30	120 Winter	10	+0%	1/15 Summer				71.299
4.001	26	15 Winter	10	+0%	100/15 Summer				70.860
4.002	27	15 Winter	10	+0%	30/120 Winter				70.760
4.003	28	120 Winter	10	+0%	30/15 Winter				70.614
1.005	18	120 Winter	10	+0%	10/15 Summer				70.609
1.006	19	120 Winter	10	+0%	10/15 Summer				70.608
1.007	20	120 Winter	10	+0%	1/15 Summer				70.607

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW2.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	13	-0.112	0.000	0.14		7.5	OK	
2.000	22	0.087	0.000	0.07		2.5	SURCHARGED	
2.001	23	0.342	0.000	0.03		1.6	SURCHARGED	
1.001	14	0.094	0.000	0.29		11.2	SURCHARGED	
1.002	15	0.262	0.000	0.26		15.8	SURCHARGED	
1.003	16	0.309	0.000	0.03		17.5	SURCHARGED	
3.000	24	0.309	0.000	0.06		4.1	SURCHARGED	
1.004	17	0.399	0.000	0.02		7.0	SURCHARGED	
4.000	25	-0.121	0.000	0.08		3.2	OK	
5.000	29	0.153	0.000	0.05		0.9	SURCHARGED	
5.001	30	0.284	0.000	0.06		0.8	SURCHARGED	
4.001	26	-0.100	0.000	0.23		3.8	OK	
4.002	27	-0.060	0.000	0.66		10.9	OK	
4.003	28	-0.061	0.000	0.12		7.1	OK	
1.005	18	0.439	0.000	0.02		12.8	SURCHARGED	
1.006	19	0.525	0.000	0.03		14.7	SURCHARGED	
1.007	20	1.037	0.000	0.03		8.3	SURCHARGED	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 6008-SW NW3.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.900
Ratio R	0.400	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	75	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for 6008-SW NW3.SWS

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	11.809	0.120	98.4	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	17.220	0.175	98.4	0.022	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	7.679	0.045	170.0	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	24.658	0.145	170.1	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	25.889	0.085	304.6	0.067	0.00	0.0	0.600	o	750	Pipe/Conduit	
2.000	5.654	0.035	161.5	0.087	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	28.461	0.190	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	31.015	0.105	295.4	0.067	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.005	7.240	0.025	289.6	0.021	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	75.00	5.19	71.150	0.017	0.0	0.0	0.0	1.01	17.9	3.5
1.001	75.00	5.48	71.030	0.039	0.0	0.0	0.0	1.01	17.9	7.9
1.002	75.00	5.61	70.780	0.077	0.0	0.0	0.0	1.00	39.8	15.6
1.003	75.00	6.02	70.735	0.103	0.0	0.0	0.0	1.00	39.7	20.9
1.004	75.00	6.29	70.065	0.170	0.0	0.0	0.0	1.60	706.1	34.5
2.000	75.00	5.09	70.835	0.087	0.0	0.0	0.0	1.03	40.8	17.7
2.001	75.00	5.54	70.800	0.087	0.0	0.0	0.0	1.07	42.4	17.7
2.002	75.00	5.86	70.085	0.154	0.0	0.0	0.0	1.62	717.1	31.3
1.005	75.00	6.36	69.980	0.345	0.0	0.0	0.0	1.64	724.2	70.1

Network Design Table for 6008-SW NW3.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	4.426	0.044	100.6	0.068	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	3.681	0.037	99.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	43.415	0.145	300.0	0.029	0.00	0.0	0.600	o	750	Pipe/Conduit	
4.000	4.038	0.040	101.0	0.069	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	6.095	0.061	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	8.029	0.033	240.0	0.008	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	75.00	5.07	71.600	0.068	0.0	0.0	0.0	1.00	17.7	13.8
3.001	75.00	5.13	71.556	0.068	0.0	0.0	0.0	1.01	17.8	13.8
1.006	75.00	6.81	69.955	0.442	0.0	0.0	0.0	1.61	711.5	89.8
4.000	75.00	5.07	71.150	0.069	0.0	0.0	0.0	1.00	17.7	14.0
4.001	75.00	5.17	71.110	0.069	0.0	0.0	0.0	1.00	17.8	14.0
1.007	75.00	6.94	69.810	0.519	0.0	0.0	0.0	1.01	71.4«	105.4

PIPELINE SCHEDULES for 6008-SW NW3.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	31	72.417	71.150	1.117	Open Manhole	1200
1.001	o	150	32	72.279	71.030	1.099	Open Manhole	1200
1.002	o	225	33	72.159	70.780	1.154	Open Manhole	1200
1.003	o	225	34	72.190	70.735	1.230	Open Manhole	1200
1.004	o	750	35	72.504	70.065	1.689	Open Manhole	1800
2.000	o	225	40	72.734	70.835	1.674	Open Manhole	1200
2.001	o	225	41	72.701	70.800	1.676	Open Manhole	1200
2.002	o	750	42	72.880	70.085	2.045	Open Manhole	1800
1.005	o	750	36	72.490	69.980	1.760	Open Manhole	1800
3.000	o	150	43	72.300	71.600	0.550	Open Manhole	1200
3.001	o	150	44	72.300	71.556	0.594	Open Manhole	1200
1.006	o	750	37	72.400	69.955	1.695	Open Manhole	1800
4.000	o	150	45	71.850	71.150	0.550	Open Manhole	1200
4.001	o	150	46	71.802	71.110	0.542	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	11.809	98.4	32	72.279	71.030	1.099	Open Manhole	1200
1.001	17.220	98.4	33	72.159	70.855	1.154	Open Manhole	1200
1.002	7.679	170.0	34	72.190	70.735	1.230	Open Manhole	1200
1.003	24.658	170.1	35	72.504	70.590	1.689	Open Manhole	1800
1.004	25.889	304.6	36	72.490	69.980	1.760	Open Manhole	1800
2.000	5.654	161.5	41	72.701	70.800	1.676	Open Manhole	1200
2.001	28.461	150.0	42	72.880	70.610	2.045	Open Manhole	1800
2.002	31.015	295.4	36	72.490	69.980	1.760	Open Manhole	1800
1.005	7.240	289.6	37	72.400	69.955	1.695	Open Manhole	1800
3.000	4.426	100.6	44	72.300	71.556	0.594	Open Manhole	1200
3.001	3.681	99.5	37	72.400	71.519	0.731	Open Manhole	1800
1.006	43.415	300.0	38	71.833	69.810	1.273	Open Manhole	1800
4.000	4.038	101.0	46	71.802	71.110	0.542	Open Manhole	1200
4.001	6.095	100.0	38	71.833	71.049	0.634	Open Manhole	1800

PIPELINE SCHEDULES for 6008-SW NW3.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.007	o	300	38	71.833	69.810	1.723	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.007	8.029	240.0	39	71.650	69.777	1.573	Open Manhole	1350

Free Flowing Outfall Details for 6008-SW NW3.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	39	71.650	69.777	0.000	1350	0

Simulation Criteria for 6008-SW NW3.SWS

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for 6008-SW NW3.SWS

Orifice Manhole: 44, DS/PN: 3.001, Volume (m³): 0.9

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 71.556

Orifice Manhole: 46, DS/PN: 4.001, Volume (m³): 0.8

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 71.110

Complex Manhole: 38, DS/PN: 1.007, Volume (m³): 23.6

Hydro-Brake Optimum®

Unit Reference	MD-SHE-0086-3900-1500-3900
Design Head (m)	1.500
Design Flow (l/s)	3.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	86
Invert Level (m)	69.810
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.9
Flush-Flo™	0.377	3.6
Kick-Flo®	0.772	2.9
Mean Flow over Head Range	-	3.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	1.200	3.5	3.000	5.4	7.000	8.0
0.200	3.3	1.400	3.8	3.500	5.8	7.500	8.3
0.300	3.6	1.600	4.0	4.000	6.2	8.000	8.5
0.400	3.6	1.800	4.2	4.500	6.5	8.500	8.8
0.500	3.5	2.000	4.4	5.000	6.8	9.000	9.0
0.600	3.4	2.200	4.7	5.500	7.2	9.500	9.3
0.800	2.9	2.400	4.8	6.000	7.5		
1.000	3.2	2.600	5.0	6.500	7.7		

Weir

Discharge Coef 0.544 Width (m) 1.500 Invert Level (m) 71.315

Storage Structures for 6008-SW NW3.SWS

Cellular Storage Manhole: 40, DS/PN: 2.000

Invert Level (m) 70.835 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	30.0	0.801	0.0	47.5
0.800	30.0	47.5			

Porous Car Park Manhole: 43, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.3
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	87.5	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	71.600	Membrane Depth (mm)	0

Porous Car Park Manhole: 45, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.1
Membrane Percolation (mm/hr)	1000	Length (m)	45.0
Max Percolation (l/s)	88.8	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	71.150	Membrane Depth (mm)	0

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW3.SWS

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 10, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	31	15 Winter	10	+0%	30/60 Winter				71.205
1.001	32	240 Winter	10	+0%	10/240 Winter				71.190
1.002	33	240 Winter	10	+0%	10/60 Winter				71.189
1.003	34	240 Winter	10	+0%	10/60 Winter				71.189
1.004	35	240 Winter	10	+0%	10/60 Summer				71.187
2.000	40	240 Winter	10	+0%	10/120 Winter				71.189
2.001	41	240 Winter	10	+0%	10/120 Winter				71.188
2.002	42	240 Winter	10	+0%	10/60 Summer				71.187
1.005	36	240 Winter	10	+0%	10/30 Winter				71.187
3.000	43	240 Winter	10	+0%	1/120 Winter				71.840
3.001	44	240 Winter	10	+0%	1/30 Summer				71.838
1.006	37	240 Winter	10	+0%	10/30 Winter				71.187
4.000	45	240 Winter	10	+0%	1/240 Winter				71.382
4.001	46	240 Winter	10	+0%	1/30 Winter				71.381
1.007	38	240 Winter	10	+0%	1/15 Summer				71.187

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW3.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	31	-0.095	0.000	0.28		4.6	OK	
1.001	32	0.010	0.000	0.12		2.0	SURCHARGED	
1.002	33	0.184	0.000	0.13		3.9	SURCHARGED	
1.003	34	0.229	0.000	0.14		5.2	SURCHARGED	
1.004	35	0.372	0.000	0.02		8.0	SURCHARGED	
2.000	40	0.129	0.000	0.15		4.4	SURCHARGED	
2.001	41	0.163	0.000	0.11		4.4	SURCHARGED	
2.002	42	0.352	0.000	0.01		7.1	SURCHARGED	
1.005	36	0.457	0.000	0.02		7.8	SURCHARGED	
3.000	43	0.090	0.000	0.05		0.7	SURCHARGED	
3.001	44	0.132	0.000	0.06		0.7	SURCHARGED	
1.006	37	0.482	0.000	0.01		8.5	SURCHARGED	
4.000	45	0.082	0.000	0.05		0.7	SURCHARGED	
4.001	46	0.121	0.000	0.04		0.7	SURCHARGED	
1.007	38	1.077	0.000	0.07		3.7	SURCHARGED	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 6008-SW NW4.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.900
Ratio R	0.400	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	75	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for 6008-SW NW4.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	6.466	0.065	99.5	0.085	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	7.237	0.075	96.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	75.00	5.11	68.800	0.085	0.0	0.0	0.0	1.01	17.8	17.3
1.001	75.00	5.22	68.735	0.085	0.0	0.0	0.0	1.02	18.1	17.3

PIPELINE SCHEDULES for 6008-SW NW4.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	48	70.200	68.800	1.250	Open Manhole	1200
1.001	o	150	49	70.097	68.735	1.212	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	6.466	99.5	49	70.097	68.735	1.212	Open Manhole	1200
1.001	7.237	96.5	46	69.944	68.660	1.134	Open Manhole	1200

Free Flowing Outfall Details for 6008-SW NW4.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001	46	69.944	68.660	68.285	1200	0

Simulation Criteria for 6008-SW NW4.SWS

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for 6008-SW NW4.SWS

Complex Manhole: 49, DS/PN: 1.001, Volume (m³): 1.6

Hydro-Brake Optimum®

Unit Reference	MD-SHE-0049-1000-0800-1000
Design Head (m)	0.800
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	49
Invert Level (m)	68.735
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	1.0
Flush-Flo™	0.215	0.9
Kick-Flo®	0.437	0.8
Mean Flow over Head Range	-	0.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.8	1.200	1.2	3.000	1.8	7.000	2.7
0.200	0.9	1.400	1.3	3.500	1.9	7.500	2.8
0.300	0.9	1.600	1.4	4.000	2.1	8.000	2.9
0.400	0.8	1.800	1.4	4.500	2.2	8.500	2.9
0.500	0.8	2.000	1.5	5.000	2.3	9.000	3.0
0.600	0.9	2.200	1.6	5.500	2.4	9.500	3.1
0.800	1.0	2.400	1.6	6.000	2.5		
1.000	1.1	2.600	1.7	6.500	2.6		

Weir

Discharge Coef 0.544 Width (m) 1.200 Invert Level (m) 69.535

Storage Structures for 6008-SW NW4.SWS

Cellular Storage Manhole: 48, DS/PN: 1.000

Invert Level (m) 68.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	40.0	0.801	0.0	60.3
0.800	40.0	60.2			

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 6008-SW NW4.SWS

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 10, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	48	120 Winter	10	+0%	1/60 Winter				69.170
1.001	49	120 Winter	10	+0%	1/15 Summer				69.168

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	48	0.220	0.000	0.08		1.1	SURCHARGED	
1.001	49	0.283	0.000	0.06		0.9	SURCHARGED	

From: Geoff Noke [redacted]
Sent: 26 October 2018 16:06
To: Lucy Smith <[redacted]
Subject: FW: DS4060971:ADNS:OX26 1BT:Kingsmere Parcel KMG 35prprties £75k

Lucy - FYI

From: Geoff Nokes
Sent: 11 October 2018 11:05
To: 'James Kirby (Linden Homes)[redacted]
Subject: RE: DS4060971:ADNS:OX26 1BT:Kingsmere Parcel KMG 35prprties £75k

Yes that is the plan, giving about 10 days notice to me for an inspection please

From: James Kirby (Linden Home [redacted]
Sent: 11 October 2018 10:38
To: Geoff Nokes [redacted]
Subject: RE: DS4060971:ADNS:OX26 1BT:Kingsmere Parcel KMG 35prprties £75k

Geoff,
thank you for your speedy response.
I do not normally deal with this side of the site.
I am arranging payment to be made.
Do I then need to pass both yours and the ground workers details to one another for the inspections to be arranged?

Kind Regards
James

James Kirby
Technical Co-ordinator
james.kirby@lindenhomes.co.uk

Tel: 01235 545000

Linden Homes Thames Valley
18D Croft Drive
Milton Park
Abingdon
Oxfordshire OX14 4RP
www.lindenhomes.co.uk

From: Geoff Noke [redacted]
Sent: 11 October 2018 10:36
To: James Kirby (Linden Homes[redacted]
Subject: RE: DS4060971:ADNS:OX26 1BT:Kingsmere Parcel KMG 35prprties £75k

James

These proposals are Technically Approved and the inspection fees can be agreed at £1875, with £500 application fee already being paid the outstanding fee is £1375 no vat to pay please.

Regards
Geoff Nokes
Developer Services – Sewer Adoptions Engineer
Office: 0203 5779 228[redacted]
geoff.nokes@thameswater.co.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB

From: James Kirby (Linden Homes [redacted]
Sent: 11 October 2018 09:59
To: Geoff Nokes [redacted]
Cc: Lee Griffin (Linden Homes) [redacted]
Subject: RE: DS4060971:ADNS:OX26 1BT:Kingsmere Parcel KMG 35prprties £75k

Geoff,
The attached was the pdf I am told was submitted.
I trust this is everything you need?
Kind Regards
James

James Kirby
Technical Co-ordinator
james.kirby@lindenhomes.co.uk

Tel: 01235 545000

Linden Homes Thames Valley
18D Croft Drive
Milton Park
Abingdon
Oxfordshire OX14 4RP
www.lindenhomes.co.uk

From: Geoff Noke [redacted]
Sent: 10 October 2018 17:08
To: James Kirby (Linden Homes) [redacted]
Subject: DS4060971:ADNS:OX26 1BT:Kingsmere Parcel KMG 35prprties £75k

James

Could you please send me pdf S104 adoption proposals drawing as it didn't appear to have been included with the application form.

Regards

Geoff Nokes
Developer Services – Sewer Adoptions Engineer
Office: 0203 5779 228 [redacted]
geoff.nokes@thameswater.co.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB

Thames Water Limited (company number 2366623) and Thames Water Utilities Limited (company number 2366661) are companies registered in England and Wales, both are registered at Clearwater Court, Vastern Road, Reading, Berkshire RG1 8DB. This email is confidential and is intended only for the use of the person it was sent to. Any views or opinions in this email are those of the author and don't necessarily represent those of Thames Water Limited or its subsidiaries. If you aren't the intended recipient of this email, please don't copy, use, forward or disclose its contents to any other person – please destroy and delete the message and any attachments from your system.

DISCLAIMER: This email, together with any attachments, is for the exclusive and confidential use of the addressee(s) and may contain legally privileged information. Any other distribution, use or reproduction without the sender's prior consent is unauthorised and strictly prohibited. If you have received this email in error please notify the sender by telephone, fax or email immediately and destroy the message without making any copies. For details on how we process and safeguard electronic communications, including the use of any personal data disclosed by the sender, refer to our Privacy Notice

---

This email has been scanned by the Symantec Email Security.cloud service.

Developer Services

Ryan Taylor COLE EASDON CONSULTANTS

Unit 2, York House, Edison Park, Dorcan Way,

Swindon,

Wiltshire,

SN3 3RB

Your ref
Our ref DS6057325
Name Geoff Nokes
Phone 0800 009 3921
Email developer.services@thameswater.co.uk

11 September 2020

Dear Ryan

Sewer Adoption under Section 104 of the Water Industry Act 1991

Site Address: DS6057325 Lnd off Pioneer Way Parcel KMF Kingsmere Bicester OX26 1BF CW 142 prprties £550k Linden TA

Thank you for your Section 104 adoption application for the above site.

We are pleased to confirm that your proposals as shown on drawing number 6008/125/01-4 are acceptable to us in principle, subject to completion of a suitable Section 104 Agreement. Our acceptance is also subject to a number of conditions and statements which are listed below.

These works may be undertaken by a competent contractor of your choice so long as they have operatives qualified for working in confined spaces.

1. All plans should include the following statement: 'All adoptable drainage works to be constructed as detailed in Sewers for Adoption, 7th edition' or as stipulated in Thames Water's Addendum.
2. No private drainage shown coloured on the proposed Agreement plan.
3. Pressure testing programme. Sewers for adoption 7th Edition E7.3.3 sets out the requirement for an air-test once backfilling is complete. In the case of sewers constructed using plastic pipework of less than 400mm diameter, TWUL requires that under clause E1.3, the post-backfilling test shall be carried out at the end of the maintenance period to confirm that any high pressure jetting carried out under clause E7.1.1 has not damaged the pipework. For complex developments, TWUL may require the developer to provide an air testing programme showing how the air testing of plastic pipework will be carried out.
   NOTE: For the avoidance of doubt, for new clay and concrete sewers, no air test is required at the end of the maintenance period as their resistance to high pressure jetting is much greater. See WRC Jetting Guidance for further information.

Thames Water
Developer Services
3rd Floor West
Clearwater Court
Vastern Road
Reading
RG1 8DB

T 0800 009 3921
I www.thameswater.co.uk

4. Trees and shrubs of a large size or heavy canopy, or with a moderate or high water demand must not be planted within any sewer easement.

Thames Water
Developer Services
3rd Floor West
Clearwater Court
Vastern Road
Reading
RG1 8DB

T 0800 009 3921
I www.thameswater.co.uk

NEXT STEPS 1 LEGAL AGREEMENT

Please supply the following information so that we can instruct our solicitors to prepare the Agreement.

- Received 1 No. copy of the technically approved adoptable drainage layout plan to be included in the agreement.
- Payment for our inspection fees to the value of £13250, representing 2.5% of the scheme estimate after deduction of initial £500 application fee. Please note that in addition our solicitors will also request a fee in the region of £600 to draft the legal agreement.
- A completed copy of the enclosed Legal Instruction Form as attached. Please complete all sections marked Developer/Agent.

Thames Water will require a surety (e.g. an independent bank or financial institution) to be party to the Agreement who will be liable for £55000

2 SITE INSPECTIONS

Gravity Sewer
Please provide pdf copy of the updated drainage design (adoptable drainage layout plan,) this will be submitted to our Field Engineer to complete the inspections. They will contact you to arrange this. Please provide us with the onsite contact details or the Developer contact if no onsite contact detail is available at this point.

3 PROVISIONAL CERTIFICATE

In order to issue the Provisional Certificate of Substantial Completion we will need the following items in place:
1) Signed Agreement
2) Satisfactory inspection and CCTV Survey of the adoptable sewers
3) As Built drawings
4) Confirmation that at least 50% of the properties are occupied

4 FINAL CERTIFICATE
Following the 12 months Maintenance Period we will carry out a final inspection before issuing the Final Certificate. Please contact the Field Engineer to arrange the final inspection quoting the Service Order provided.

If you have any questions please give the Helpdesk a call on 0800 009 3921. We are open 8am-5pm, Monday to Friday, or you can email us at developer.services@thameswater.co.uk.

We look forward to hearing from you.

Yours sincerely

[redacted]

Development Engineer – Wastewater

Thames Water
Developer Services
3rd Floor West
Clearwater Court
Vastern Road
Reading
RG1 8DB

T 0800 009 3921
I www.thameswater.co.uk

Please quote our ref: L-21385-2.4.2-18-S156-TPC

9 March, 2018

Alex Pook
Linden Homes Thames Valley
18d Croft Drive
Milton Park
Abingdon
Oxfordshire
OX14 4RP

By e-mail only: [redacted]

Dear Mr Pook

PARCELS KMF AND KMG, HAWKSWOOD, BICESTER
SOAKAGE TEST RESULTS

Further to the site work carried out on 22 February 2018, we are pleased to provide this letter report which includes a brief account of the ground conditions encountered and an assessment of the soakage potential of the near surface soils at the site.

The investigation comprised five soakage test locations as agreed in advance of works. One pre-agreed soakage test location (MTP4) was unable to be accessed as roadways were yet to be built. As a result, the water tanker could not get close enough to the test location. It was anticipated that the soakage tests would be conducted within the expected natural gravelly soils which exist below topsoil at shallow depth. Test locations were numbered MTP1, MTP2, MTP3, MTP5 and MTP6 with test depths ranging from 1.7 to 2.4 metres below ground level (m bgl).

Ground conditions encountered in the test locations typically comprised a layer of topsoil underlain by light brown mottled grey silty sandy gravelly Clay over Limestone and Mudstone cobbles and gravel. Trial pit locations are indicated on the attached plan (Drawing No. 21385-304-001), whilst engineers logs and soakage test results are also attached to this letter.

The trial pits were dug using a 12 tonne 360 tracked excavator. Soakage tests were carried out in the pits over a maximum period of 4 hours, with the sides and bases squared off prior to filling with water from a 10,000 gallon water tanker. A selection of photographs of the soakage pit locations are presented below:

Continued from page 1

Plate 1: MTP1

Plate 2: MTP3

Continued from page 2

Plate 3: MTP5

The trial pit soakage tests were performed as far as possible in accordance with BRE document 365. The accompanying data sheets show that the water level fell by a maximum of 160 mm over a period of 3 hours in MTP1; 630 mm over a period of 4 hours in MTP2; 100 mm over a period of 2 hours in MTP3; 390 mm over a period of 3 hours in MTP5 and 340 mm over a period of 3.5 hours in MTP6.

The BRE methodology for calculation of soil infiltration rate requires measurement of the volume out flowing from between 75 % and 25 % of the effective depth of the trial pit (height of water in the pit), i.e. three-quarters of the water should soak away. If, due to low levels of infiltration the water level does not fall from between 75 % to 25 % of the total water height, it may be possible to extrapolate from a curve derived from the plots of actual depth to water against time elapsed.

Data obtained from the tests allowed extrapolation from only one test location, MTP2, due to the slow rate of infiltration. The test conducted in MTP2 was the only test to achieved 75 % of effective depth. Therefore, based on the data obtained, it is estimated that an infiltration rate in the order of 1.0×10^{-7} or 1.0×10^{-8} m/s would apply in these locations.

Based on the soakage tests carried out to date, the near surface soils do not generally appear to be suitable for use as a soakage medium due to their predominantly cohesive nature.

We trust that the above information is helpful; however, if you have any questions, please do not hesitate to contact us.

Yours sincerely

[redacted]

Tim Crowe
For Idom Merebrook Ltd

enc Drawing No. 21385-304-001
Trial Pit Logs
Soakage Test Results Sheets

Legend

- Site Boundary
- MTPRef Merebrook soakage test with location reference

First Issue	09/03/2017		-
	SR	TC	TC
Issue Details	Dwn	Chd	App'd

Client

Linden Homes Thames Valley

Project

Hawkeswood, Bicster

Dwg Title

Undertaken Soakage Test Locations

Job No. 21385	Dwg No. 304-001	Revision -
Scale 1:1000	Date March 2018	Frame Dimensions mm (A1) 791 x 544
Drawn SR	Checked TC	Approved TC

London
Kent
Derbyshire
Cardiff
Manchester
Stirling
Birmingham

idom merebrook

Cromford Mills, Mill Lane, Matlock, Derbyshire, England. DE4 3RQ
tel +44(0)1773 829568 fax +44(0)1773 825393 email info@merebrook.co.uk

idom merebrook
Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
merebrook.co.uk idom.com
AN idom GROUP COMPANY
offices London Kent Derby Cardiff Manchester Stirling

TRIAL PIT LOG

TrialPit No
MTP1
Sheet 1 of 1

Project Name:	Kingsmere, Hawkswood	Project No. 21385	Co-ords: 457430.00 - 221878.00 Level:
Date	22/02/2018		
Location:	Bicester	Dimensions (m): 1.90 × 0.60	Scale 1:25
Equipment:	JCB 3CX	Depth 1.70	Logged TPC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			TOPSOIL. Grass over light grey brown very sandy clay with organic rootlets throughout.
				0.60			Light orange brown very soft sandy gravelly CLAY. Gravel is angular sandstone and mudstone.
				1.00			Light grey brown soft to firm slightly silty CLAY with organic rootlets throughout.
				1.30			Orange brown soft very sandy slightly gravelly CLAY with orange red sand pockets. Gravel is angular weather limestone and mudstone.
				1.70			Light grey sandy gravelly CLAY. Gravel is angular limestone.
				1.71			LIMESTONE End of Pit at 1.700m

1
2
3
4
5

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Stability
Pit Stable

Remarks

idom merebrook
Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
merebrook.co.uk idom.com
AN idom GROUP COMPANY
offices London Kent Derby Cardiff Manchester Stirling

TRIAL PIT LOG

TrialPit No
MTP2
Sheet 1 of 1

Project Name:	Kingsmere, Hawkswood	Project No. 21385	Co-ords: 457497.00 - 221827.00 Level:
Date	22/02/2018		
Location:	Bicester	Dimensions (m): 2.20 x 0.60 Depth 1.90	Scale 1:25
Equipment:	JCB 3CX		Logged TPC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Grass over reworked grey mottled orange brown sandy clay with organic rootlets throughout. MADE GROUND
				0.35			Reworked dark grey brown very sandy gravelly clay. Gravel is angular mudstone and plastic. MADE GROUND
				0.80			Orange brown very sandy gravelly CLAY. Gravel is angular limestone.
				1.90			Gravel and cobbles of angular LIMESTONE within a soft sandy clay matrix.
				1.91			LIMESTONE End of Pit at 1.900m

1
2
3
4
5

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Stability
Pit Stable

Remarks

idom merebrook
Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
merebrook.co.uk idom.com
AN idom GROUP COMPANY
offices London Kent Derby Cardiff Manchester Stirling

TRIAL PIT LOG

TrialPit No
MTP3
Sheet 1 of 1

Project Name:	Kingsmere, Hawkswood	Project No. 21385	Co-ords: 457543.00 - 221954.00 Level:
Date	22/02/2018		
Location:	Bicester	Dimensions (m): 2.10 x 0.60	Scale 1:25
Equipment:	JCB 3CX	Depth 2.40	Logged TPC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			TOPSOIL. Grass over light grey brown very sandy clay with organic rootlets throughout. Orange brown soft very sandy CLAY with organics throughout.
				0.90			Blue grey stiff CLAY.
				1.20			Dark grey blue very sandy gravelly stiff CLAY. Gravel is angular limestone. Sand is fine to coarse and orange brown in colour.
				2.40			End of Pit at 2.400m

1 2 3 4 5

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Stability
Pit Stable

Remarks

idom merebrook
Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
merebrook.co.uk idom.com
AN idom GROUP COMPANY
offices London Kent Derby Cardiff Manchester Stirling

TRIAL PIT LOG

TrialPit No
MTP4
Sheet 1 of 1

Project Name:	Kingsmere, Hawkswood	Project No. 21385	Co-ords: 457479.00 - 222111.00 Level:
Location:	Bicester		Dimensions (m): Depth
Equipment:			

Date
Scale 1:25
Logged

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description

1
2
3
4
5

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Stability

Remarks
Unable to get tanker close enough to carry out soakaway test. Pit not advanced.

idom merebrook
Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
merebrook.co.uk idom.com
AN idom GROUP COMPANY
offices London Kent Derby Cardiff Manchester Stirling

TRIAL PIT LOG

TrialPit No
MTP5
Sheet 1 of 1

Project Name:	Kingsmere, Hawkswood	Project No. 21385	Co-ords: 457589.00 - 222028.00 Level:
Date	22/02/2018		
Location:	Bicester	Dimensions (m): 1.90 x 0.60	Scale 1:25
Equipment:	JCB 3CX	Depth 1.80	Logged TPC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			TOPSOIL. Grass over light grey brown very sandy clay with organic rootlets throughout.
				1.00			Light brown soft very sandy CLAY with organics throughout.
				1.50			Blue grey stiff CLAY.
				1.70			Orange brown very sandy gravelly CLAY. Gravel is weathered angular Mudstone and Limestone.
				1.80			LIMESTONE.
							End of Pit at 1.800m

1
2
3
4
5

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Stability
Pit Stable

Remarks

idom merebrook
Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
merebrook.co.uk idom.com
AN idom GROUP COMPANY
offices London Kent Derby Cardiff Manchester Stirling

TRIAL PIT LOG

TrialPit No
MTP6
Sheet 1 of 1

Project Name:	Kingsmere, Hawkswood	Project No. 21385	Co-ords: 457645.00 - 222021.00 Level:
Date	22/02/2018		
Location:	Bicester	Dimensions (m): 2.00 x 0.60 Depth 1.70	Scale 1:25
Equipment:	JCB 3CX		Logged TPC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							TOPSOIL. Grass over light grey brown very sandy clay with organic rootlets throughout.
				0.65			Light grey mottled orange brown soft slightly sandy CLAY.
				0.70			Blue Grey stiff CLAY.
				1.00			Orange brown very sandy silty gravelly CLAY with cobbles of weathered angular mudstone throughout. Gravel is angular mudstone.
				1.50			LIMESTONE.
				1.70			End of Pit at 1.700m

1
2
3
4
5

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Stability
Pit Stable

Remarks

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION					
Site Name:	***Kingsmere, Hawkswood, Bicester***			**Job No:**	***21385***
Engineer:	***Sam Raven***	**Date:**	***22/02/2018***	**Weather:**	***Overcast, Dry***

TEST PIT DETAILS							
Trial Pit Number:	***MTP1***		**Test** ***1*** **of** ***3***				
Length (m):	***1.9***	**Width (m):**	***0.6***		**Depth (m):**	***1.7***	
Depth to Groundwater (m):	***N/A***						
Time Filling Commenced:	***09:29***		**Time Filling Completed:**			***09:38***	
Depth to Water at Start of Test:		***0.17***					
Effective Depths:		**75%:**	***0.55***	**50%:**	***0.94***	**25%:**	***1.32***

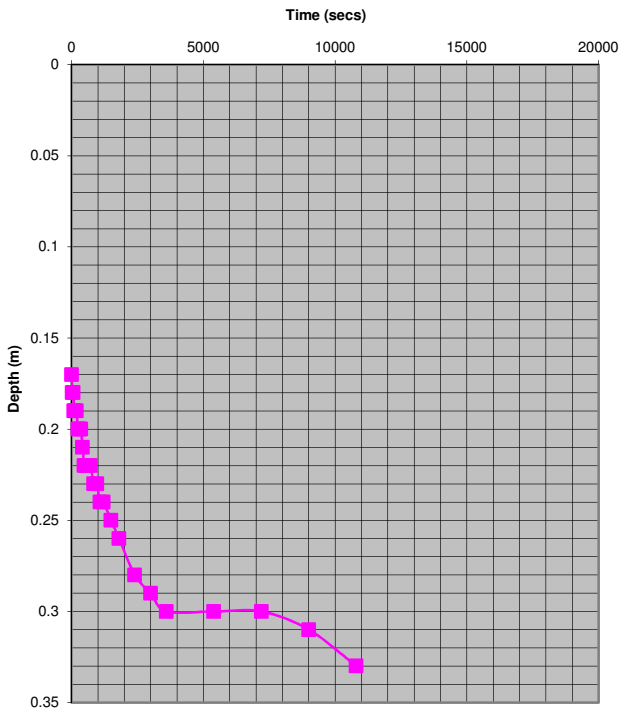
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
09:38	0	0	0.170
	0.5	30	0.180
09:39	1	60	0.180
	1.5	90	0.190
09:40	2	120	0.190
09:41	3	180	0.190
09:42	4	240	0.200
09:43	5	300	0.200
09:44	6	360	0.200
09:45	7	420	0.210
09:46	8	480	0.220
09:47	9	540	0.220
09:48	10	600	0.220
09:50	12	720	0.220
09:52	14	840	0.230
09:54	16	960	0.230
09:56	18	1080	0.240
09:58	20	1200	0.240
10:03	25	1500	0.250
10:08	30	1800	0.260
10:18	40	2400	0.280
10:28	50	3000	0.290
10:38	60	3600	0.300
11:08	90	5400	0.300
11:38	120	7200	0.300
12:08	150	9000	0.310
12:38	180	10800	0.330
	210	12600	
	240	14400	
	270	16200	
	300	18000	

MTP1



t at 75% Effective Depth: ..... secs
t at 25% Effective Depth: ..... secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.87***	m3
ap50:	***4.965***	m2
tp75-25	***0***	secs

f = ***#DIV/0!*** **m/s**

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	***Kingsmere, Hawkswood, Bicester***			**Job No:**	***21385***
Engineer:	***Michael Whittall***	**Date:**	***22/02/2018***	**Weather:**	***Overcast, Dry***

TEST PIT DETAILS

Trial Pit Number:	***MTP2***		**Test** ***1*** **of** ***3***				
Length (m):	***2.2***	**Width (m):**	***0.6***		**Depth (m):**	***1.9***	
Depth to Groundwater (m):	***N/A***						
Time Filling Commenced:	***09:47***		**Time Filling Completed:**			***10:05***	
Depth to Water at Start of Test:		***0.59***					
Effective Depths:		**75%:**	***0.92***	**50%:**	***1.25***	**25%:**	***1.57***

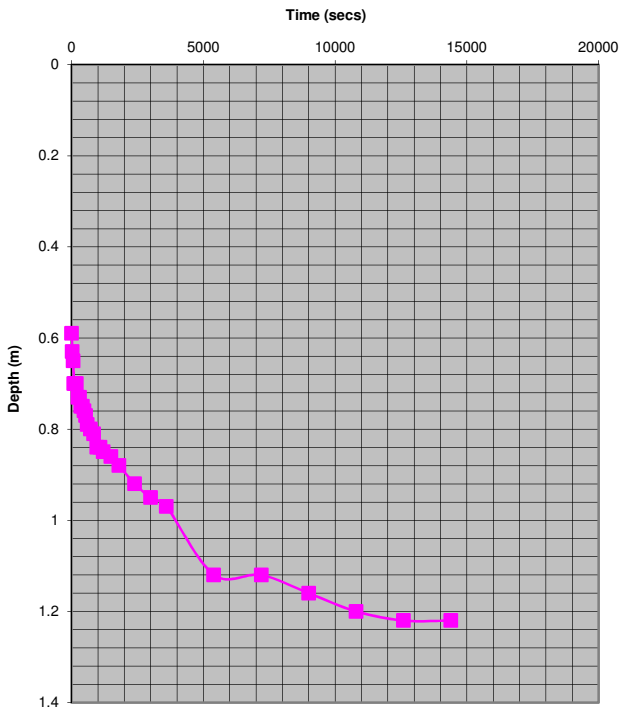
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
10:05	0	0	0.590
10:05:30	0.5	30	0.630
10:06	1	60	0.650
10:06:30	1.5	90	0.700
10:07	2	120	0.700
10:08	3	180	0.700
10:09	4	240	0.730
10:10	5	300	0.730
10:11	6	360	0.750
10:12	7	420	0.750
10:13	8	480	0.760
10:14	9	540	0.770
10:15	10	600	0.790
10:17	12	720	0.800
10:19	14	840	0.810
10:21	16	960	0.840
10:23	18	1080	0.840
10:25	20	1200	0.850
10:30	25	1500	0.860
10:40	30	1800	0.880
10:50	40	2400	0.920
11:00	50	3000	0.950
11:05	60	3600	0.970
11:35	90	5400	1.120
12:05	120	7200	1.120
12:35	150	9000	1.160
13:05	180	10800	1.200
13:35	210	12600	1.220
14:05	240	14400	1.220
	270	16200	
	300	18000	

MTP2



t at 75% Effective Depth: ..... secs
t at 25% Effective Depth: ..... secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.86***	m3
ap50:	***4.988***	m2
tp75-25	***0***	secs

f = ***#DIV/0!*** **m/s**

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION					
Site Name:	***Kingsmere, Hawkswood, Bicester***			**Job No:**	***21385***
Engineer:	***Sam Raven***	**Date:**	***22/02/2018***	**Weather:**	***Overcast, Dry***

TEST PIT DETAILS							
Trial Pit Number:	***MTP3***		**Test** ***1*** **of** ***3***				
Length (m):	***2.1***	**Width (m):**	***0.6***		**Depth (m):**	***2.4***	
Depth to Groundwater (m):	***N/A***						
Time Filling Commenced:	***13:14***		**Time Filling Completed:**			***13:30***	
Depth to Water at Start of Test:	***0.25***						
Effective Depths:	**75%:**	***0.79***	**50%:**	***1.33***	**25%:**	***1.86***	

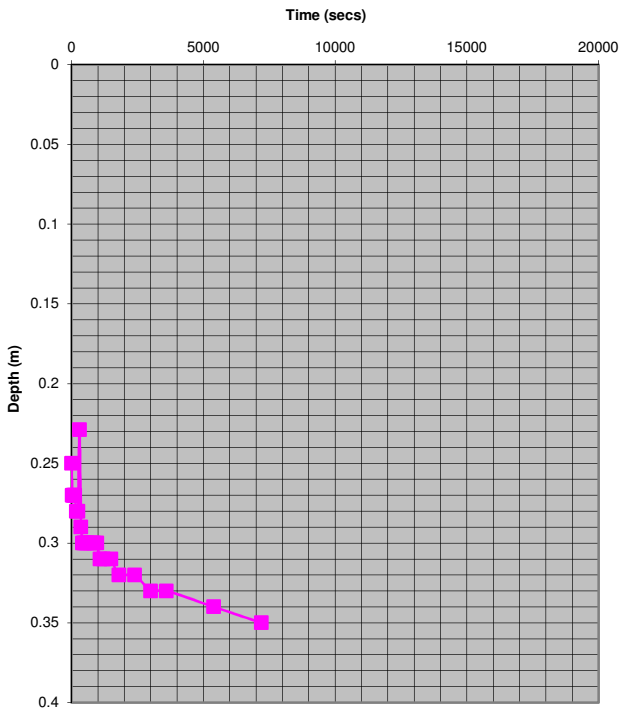
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
13:30	0	0	0.250
	0.5	30	0.270
13:31	1	60	0.270
	1.5	90	0.270
13:32	2	120	0.270
13:33	3	180	0.280
13:34	4	240	0.280
13:35	5	300	0.229
13:36	6	360	0.290
13:37	7	420	0.300
13:38	8	480	0.300
13:39	9	540	0.300
13:40	10	600	0.300
13:42	12	720	0.300
13:44	14	840	0.300
13:46	16	960	0.300
13:48	18	1080	0.310
13:50	20	1200	0.310
13:55	25	1500	0.310
14:00	30	1800	0.320
14:10	40	2400	0.320
14:20	50	3000	0.330
14:30	60	3600	0.330
15:00	90	5400	0.340
15:30	120	7200	0.350
	150	9000	
	180	10800	
	210	12600	
	240	14400	
	270	16200	
	300	18000	

MTP3



t at 75% Effective Depth: ..... secs
t at 25% Effective Depth: ..... secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***1.35***	m3
ap50:	***7.065***	m2
tp75-25	***0***	secs

f = ***#DIV/0!*** **m/s**

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	***Kingsmere, Hawkswood, Bicester***			**Job No:**	***21385***
Engineer:	***Elizabeth Whittall***	**Date:**	***22/02/2018***	**Weather:**	***Overcast and dry***

TEST PIT DETAILS

Trial Pit Number:	***MTP5***		**Test** ***1*** **of** ***3***				
Length (m):	***1.9***	**Width (m):**	***0.6***		**Depth (m):**	***1.8***	
Depth to Groundwater (m):	***N/A***						
Time Filling Commenced:	***12:01***		**Time Filling Completed:**			***12:08***	
Depth to Water at Start of Test:		***0.2***					
Effective Depths:		**75%:**	***0.60***	**50%:**	***1.00***	**25%:**	***1.40***

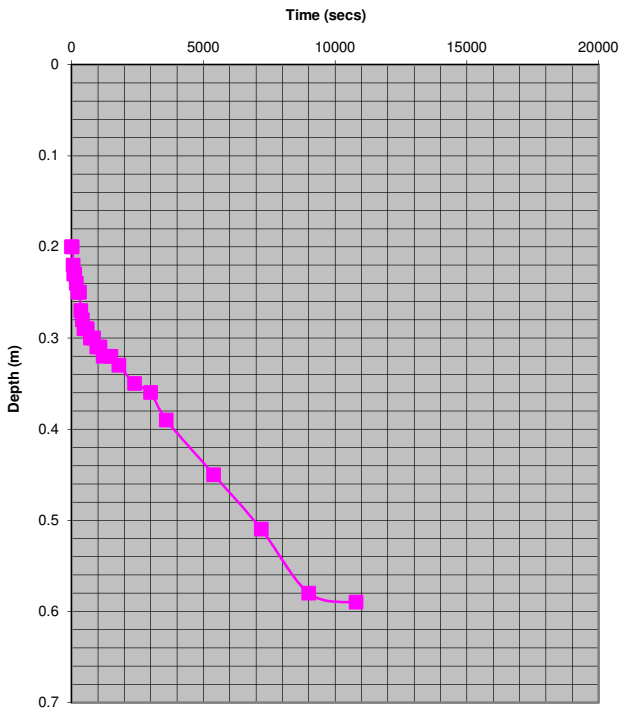
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
12:01	0	0	0.200
	0.5	30	0.200
12:02	1	60	0.220
	1.5	90	0.230
12:03	2	120	0.230
12:04	3	180	0.240
12:05	4	240	0.250
12:06	5	300	0.250
12:07	6	360	0.270
12:08	7	420	0.280
12:09	8	480	0.290
12:10	9	540	0.290
12:11	10	600	0.290
12:13	12	720	0.300
12:15	14	840	0.300
12:17	16	960	0.310
12:19	18	1080	0.310
12:21	20	1200	0.320
12:26	25	1500	0.320
12:31	30	1800	0.330
12:41	40	2400	0.350
12:51	50	3000	0.360
13:01	60	3600	0.390
13:31	90	5400	0.450
14:01	120	7200	0.510
14:31	150	9000	0.580
15:01	180	10800	0.590
	210	12600	
	240	14400	
	270	16200	
	300	18000	

MTP5



t at 75% Effective Depth: ..... secs
t at 25% Effective Depth: ..... secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.91***	m3
ap50:	***5.14***	m2
tp75-25	***0***	secs

f = *#DIV/0!* m/s

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	***Kingsmere, Hawkswood, Bicester***			**Job No:**	***21385***
Engineer:	***Elizabeth Whittall***	**Date:**	***22/02/2018***	**Weather:**	***Overcast and Dry***

TEST PIT DETAILS

Trial Pit Number:	***MTP6***		**Test** ***1*** **of** ***3***				
Length (m):	***2.0***	**Width (m):**	***0.6***		**Depth (m):**	***1.7***	
Depth to Groundwater (m):	***N/A***						
Time Filling Commenced:	***10:50***		**Time Filling Completed:**			***10:57***	
Depth to Water at Start of Test:		***0.19***					
Effective Depths:		**75%:**	***0.57***	**50%:**	***0.95***	**25%:**	***1.32***

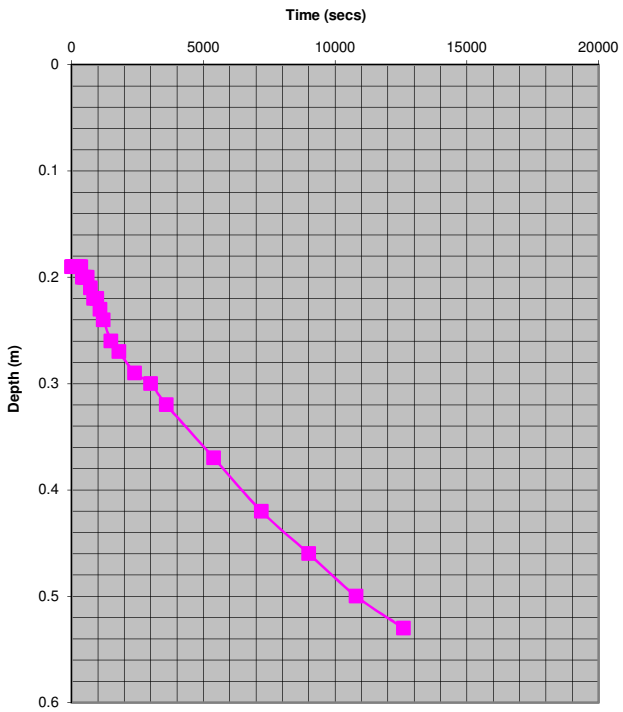
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
10:50	0	0	0.190
	0.5	30	0.190
10:51	1	60	0.190
	1.5	90	0.190
10:52	2	120	0.190
10:53	3	180	0.190
10:54	4	240	0.190
10:55	5	300	0.190
10:56	6	360	0.190
10:57	7	420	0.200
10:58	8	480	0.200
10:59	9	540	0.200
11:00	10	600	0.200
11:02	12	720	0.210
11:04	14	840	0.220
11:06	16	960	0.220
11:08	18	1080	0.230
11:10	20	1200	0.240
11:15	25	1500	0.260
11:20	30	1800	0.270
11:30	40	2400	0.290
11:40	50	3000	0.300
11:50	60	3600	0.320
12:20	90	5400	0.370
12:50	120	7200	0.420
13:20	150	9000	0.460
13:50	180	10800	0.500
14:20	210	12600	0.530
	240	14400	
	270	16200	
	300	18000	

MTP6



t at 75% Effective Depth: ..... secs
t at 25% Effective Depth: ..... secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.91***	m3
ap50:	***5.126***	m2
tp75-25	***0***	secs

f = ***#DIV/0!*** **m/s**