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Elizabeth House 39 York Road London SE1 7NQ	NORTH END ROAD YAPTON 38 UNITS_ 1 in 30 year	
Date 30/09/2025	Designed by JW	
File 19-156_AS Built 38 Units Drainage Strategy JW 20...	Checked by GG	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm_RevB_Approved design

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model			
Return Period (years)	10	Volumetric Runoff Coeff.	0.750
		PIMP (%)	100
FEH Rainfall Version	2013	Add Flow / Climate Change (%)	0
Site Location	GB 497682 103581 SU 97682 03581	Minimum Backdrop Height (m)	0.400
Data Type	Point	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	250	Min Design Depth for Optimisation (m)	0.250
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)	200

Designed with Level Soffits

Time Area Diagram for Storm_RevB_Approved design

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.072	4-8	0.068

Total Area Contributing (ha) = 0.140

Total Pipe Volume (m³) = 5.740

Network Design Table for Storm_RevB_Approved design

« - Indicates pipe capacity < flow

PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section	Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)		Design

Network Results Table

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Network Design Table for Storm_RevB_Approved design

PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)

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Network Design Table for Storm_RevB_Approved design

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	19.975	0.301	66.4	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	13.670	0.246	55.6	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	11.717	0.083	141.2	0.000	0.00	0.0	0.600	oo	150	Double Pipe	
3.000	12.152	0.176	69.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	29.069	0.116	250.6	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	30.515	0.185	164.9	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	15.755	0.164	96.1	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	15.032	0.266	56.5	0.017	5.00	0.0	0.600	o	100	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	104.71	5.27	7.060	0.027	0.0	0.0	0.0	1.24	21.8	7.7
2.000	105.51	5.17	7.005	0.019	0.0	0.0	0.0	1.35	23.9	5.4
1.001	102.92	5.50	6.759	0.046	0.0	0.0	0.0	0.84	29.8	12.8
3.000	105.52	5.17	6.852	0.021	0.0	0.0	0.0	1.21	21.4	6.0
1.002	98.64	6.09	6.601	0.075	0.0	0.0	0.0	0.82	32.7	20.1
1.003	95.31	6.59	6.485	0.095	0.0	0.0	0.0	1.02	40.4	24.6
4.000	104.81	5.26	6.617	0.020	0.0	0.0	0.0	1.03	18.1	5.7
5.000	104.91	5.24	6.769	0.017	0.0	0.0	0.0	1.03	8.1	4.8

Network Design Table for Storm_RevB_Approved design

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
4.001	10.928	0.078	140.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	18.863	0.140	134.7	0.000	0.00	0.0	0.600	oo	150	Double Pipe	
1.005	9.292	0.140	66.4	0.000	0.00	0.0	0.600	oo	150	Double Pipe	
6.000	22.494	0.297	75.7	0.008	5.00	0.0	0.600	o	100	Pipe/Conduit	
6.001	20.094	0.297	67.7	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.006	5.740	0.031	185.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.001	103.14	5.47	6.453	0.037	0.0	0.0	0.0	0.85	15.0	10.3
1.004	93.05	6.96	6.300	0.132	0.0	0.0	0.0	0.86	30.5«	33.3
1.005	92.29	7.08	6.185	0.132	0.0	0.0	0.0	1.24	43.7	33.3
6.000	103.51	5.42	6.775	0.008	0.0	0.0	0.0	0.89	7.0	2.2
6.001	100.84	5.78	6.520	0.008	0.0	0.0	0.0	0.94	7.4	2.2
1.006	91.70	7.18	5.970	0.140	0.0	0.0	0.0	0.96	38.1	34.8

Manhole Schedules for Storm_RevB_Approved design

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
	1	7.625	0.565	Open Manhole	450	1.000	7.060	150			
	2	7.325	0.320	Junction		2.000	7.005	150			
	3	7.600	0.841	Open Manhole	750 x 600	1.001	6.759	150	1.000	6.759	150
									2.000	6.759	150
	4	7.280	0.428	Open Manhole	450	3.000	6.852	150			
	5	7.740	1.139	Open Manhole	750 x 600	1.002	6.601	225	1.001	6.676	150
									3.000	6.676	150
	6	7.640	1.155	Open Manhole	600	1.003	6.485	225	1.002	6.485	225
	7	6.920	0.303	Junction		4.000	6.617	150			
	8	7.470	0.701	Open Manhole	450	5.000	6.769	100			
	9	7.090	0.637	Open Manhole	750 x 600	4.001	6.453	150	4.000	6.453	150
									5.000	6.503	100
	10	7.240	0.940	Open Manhole	1200	1.004	6.300	150	1.003	6.300	225
									4.001	6.375	150
	11	7.120	0.960	Open Manhole	1200	1.005	6.185	150	1.004	6.160	150
	11	7.225	0.450	Junction		6.000	6.775	100			
	12	7.180	0.702	Open Manhole	1200	6.001	6.520	100	6.000	6.478	100
Infiltration Blanket		6.805	0.835	Open Manhole	750 x 600	1.006	5.970	225	1.005	6.045	150
									6.001	6.223	100
		6.805	0.866	Open Manhole	0		OUTFALL		1.006	5.939	225

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Manhole Schedules for Storm_RevB_Approved design

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
	1 497786.922	103774.799	497786.922	103774.799	Required	
	2 497817.836	103761.685			No Entry	
	3 497804.884	103766.060	497804.884	103766.060	Required	
	4 497810.751	103749.194	497810.751	103749.194	Required	
	5 497800.245	103755.301	497800.245	103755.301	Required	
	6 497772.663	103764.479	497772.663	103764.479	Required	
	7 497740.472	103798.611			No Entry	
	8 497767.649	103784.318	497767.649	103784.318	Required	
	9 497753.860	103790.304	497753.860	103790.304	Required	
	10 497747.353	103781.525	497747.353	103781.525	Required	
	11 497728.982	103777.247	497728.982	103777.247	Required	

Manhole Schedules for Storm_RevB_Approved design

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
	11 497763.348	103753.912			No Entry	
	12 497742.004	103761.010	497742.004	103761.010	Required	
Infiltration Blanket	497723.806	103769.530	497723.806	103769.530	Required	
	497718.081	103769.944			No Entry	

PIPELINE SCHEDULES for Storm_RevB_Approved design

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	7.625	7.060	0.415	Open Manhole	450
2.000	o	150	2	7.325	7.005	0.170	Junction	
1.001	oo	150	3	7.600	6.759	0.691	Open Manhole	750 x 600
3.000	o	150	4	7.280	6.852	0.278	Open Manhole	450
1.002	o	225	5	7.740	6.601	0.914	Open Manhole	750 x 600
1.003	o	225	6	7.640	6.485	0.930	Open Manhole	600
4.000	o	150	7	6.920	6.617	0.153	Junction	
5.000	o	100	8	7.470	6.769	0.601	Open Manhole	450

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	19.975	66.4	3	7.600	6.759	0.691	Open Manhole	750 x 600
2.000	13.670	55.6	3	7.600	6.759	0.691	Open Manhole	750 x 600
1.001	11.717	141.2	5	7.740	6.676	0.914	Open Manhole	750 x 600
3.000	12.152	69.0	5	7.740	6.676	0.914	Open Manhole	750 x 600
1.002	29.069	250.6	6	7.640	6.485	0.930	Open Manhole	600
1.003	30.515	164.9	10	7.240	6.300	0.715	Open Manhole	1200
4.000	15.755	96.1	9	7.090	6.453	0.487	Open Manhole	750 x 600
5.000	15.032	56.5	9	7.090	6.503	0.487	Open Manhole	750 x 600

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PIPELINE SCHEDULES for Storm_RevB_Approved design

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)
4.001	o	150		9	7.090	6.453	0.487 Open Manhole	750 x 600
1.004	oo	150		10	7.240	6.300	0.790 Open Manhole	1200
1.005	oo	150		11	7.120	6.185	0.785 Open Manhole	1200
6.000	o	100		11	7.225	6.775	0.350 Junction	
6.001	o	100		12	7.180	6.520	0.560 Open Manhole	1200
1.006	o	225	Infiltration Blanket		6.805	5.970	0.610 Open Manhole	750 x 600

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)
4.001	10.928	140.1		10	7.240	6.375	0.715 Open Manhole	1200
1.004	18.863	134.7		11	7.120	6.160	0.810 Open Manhole	1200
1.005	9.292	66.4	Infiltration Blanket		6.805	6.045	0.610 Open Manhole	750 x 600
6.000	22.494	75.7		12	7.180	6.478	0.602 Open Manhole	1200
6.001	20.094	67.7	Infiltration Blanket		6.805	6.223	0.482 Open Manhole	750 x 600
1.006	5.740	185.2			6.805	5.939	0.641 Open Manhole	0

Area Summary for Storm_RevB_Approved design

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.027	0.027	0.027
2.000	-	-	100	0.019	0.019	0.019
1.001	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.021	0.021	0.021
1.002	User	-	100	0.008	0.008	0.008
1.003	User	-	100	0.008	0.008	0.008
	User	-	100	0.002	0.002	0.010
	User	-	100	0.004	0.004	0.014
	User	-	100	0.006	0.006	0.020
4.000	User	-	100	0.012	0.012	0.012
	User	-	100	0.002	0.002	0.014
	User	-	100	0.006	0.006	0.020
5.000	User	-	100	0.009	0.009	0.009
	User	-	100	0.002	0.002	0.011
	User	-	100	0.006	0.006	0.017
4.001	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.008	0.008	0.008
6.001	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.140	0.140	0.140

Free Flowing Outfall Details for Storm_RevB_Approved design

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		6.805	5.939	0.000	0	0

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Simulation Criteria for Storm_RevB_Approved design

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

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	5	Winter Storms	Yes
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 497682 103581 SU 97682 03581	Cv (Winter)	0.840
Data Type	Point Storm	Duration (mins)	30

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Online Controls for Storm_RevB_Approved design

Pump Manhole: Infiltration Blanket, DS/PN: 1.006, Volume (m³): 0.8

Invert Level (m) 6.020

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Storage Structures for Storm_RevB_Approved design

Infiltration Blanket Manhole: Infiltration Blanket, DS/PN: 1.006

Infiltration Coefficient Base (m/hr)	0.00648	Invert Level (m)	6.020	Cap Volume	Depth (m)	0.400
Safety Factor	2.0	Diameter/Width (m)	21.5			
Porosity	0.95	Length (m)	21.0			

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

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 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 497682 103581 SU 97682 03581 Cv (Summer) 1.000
FEH Rainfall Version 2013 Data Type Point Cv (Winter) 1.000

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

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

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

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water			Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
	Name	Storm							Level (m)	Depth (m)	Volume (m³)						
1.000	1	15 Summer	30	+0%					7.145	-0.065	0.000	0.60			12.3		OK
2.000	2	15 Summer	30	+0%					7.068	-0.087	0.000	0.36			8.7	FLOOD RISK*	
1.001	3	15 Summer	30	+0%	30/15 Summer				6.952	0.043	0.000	0.74			19.9	SURCHARGED	
3.000	4	15 Summer	30	+0%					6.950	-0.052	0.000	0.50			9.6		OK
1.002	5	15 Summer	30	+0%	30/15 Summer				6.921	0.095	0.000	0.98			29.7	SURCHARGED	
1.003	6	15 Summer	30	+0%	30/15 Summer				6.832	0.122	0.000	0.89			33.7	SURCHARGED	
4.000	7	15 Summer	30	+0%					6.767	0.000	0.000	0.50			9.1	FLOOD RISK*	
5.000	8	15 Summer	30	+0%	30/15 Summer				6.938	0.069	0.000	0.95			7.3	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
4.001		9	15 Summer	30	+0%	30/15 Summer			6.754	0.151	0.000	1.07		14.4
1.004		10	15 Summer	30	+0%	30/15 Summer			6.694	0.244	0.000	1.53		43.9
1.005		11	15 Summer	30	+0%	30/15 Summer			6.368	0.033	0.000	1.13		43.5
6.000		11	15 Summer	30	+0%				6.827	-0.048	0.000	0.52		3.6
6.001		12	15 Summer	30	+0%				6.571	-0.049	0.000	0.51		3.6
1.006	Infiltration Blanket	960	Winter	30	+0%				6.186	-0.009	0.000	0.00		0.0

PN	US/MH Name	Status	Level Exceeded
4.001		9 SURCHARGED	
1.004		10 SURCHARGED	
1.005		11 SURCHARGED	
6.000		11 OK*	
6.001		12 OK	
1.006	Infiltration Blanket	OK	