

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Proposed SW Network

Pipe Sizes		PipeSize	Manhole	Sizes	Manhole
FSR Rainfall Model - England and Wales					
Return Period (years)	30			PIMP (%)	100
M5-60 (mm)	20.000		Add Flow / Climate Change (%)		0
Ratio R	0.400		Minimum Backdrop Height (m)		0.200
Maximum Rainfall (mm/hr)	50		Maximum Backdrop Height (m)		0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)			0.000
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)			1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)			500
Designed with Level Soffits					

Time Area Diagram for Proposed SW Network at outfall S (pipe S1.003)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.172	4-8	0.193	8-12	0.086

Total Area Contributing (ha) = 0.451

Total Pipe Volume (m³) = 95.809

Time Area Diagram at outfall S (pipe S5.006)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.126	4-8	0.029

Total Area Contributing (ha) = 0.155

Total Pipe Volume (m³) = 9.863

Network Design Table for Proposed SW Network

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	38.348	0.256	149.8	0.117	5.00	0.0		0.075	→ ↓ ←		Porous Car Park	
S1.001	10.914	0.148	73.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	10.451	0.070	149.3	0.068	5.00	0.0	0.600		o	150	Pipe/Conduit	
S2.001	3.680	0.384	9.6	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S3.000	37.453	0.250	149.8	0.098	5.00	0.0		0.075	→ ↓ ←		Porous Car Park	

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)
S1.000	50.00	9.70	32.500	0.117	0.0	0.0	0.0	0.14	171.2	15.8
S1.001	50.00	9.80	32.244	0.117	0.0	0.0	0.0	1.83	129.6	15.8
S2.000	50.00	5.21	32.700	0.068	0.0	0.0	0.0	0.82	14.5	9.3
S2.001	50.00	5.23	32.630	0.068	0.0	0.0	0.0	3.27	57.9	9.3
S3.000	50.00	8.76	33.000	0.098	0.0	0.0	0.0	0.17	186.0	13.3

AKS Ward Limited		Page 2
10 Bonhill Street	X192068 Meadow High School	
London	Proposed SW Network	
EC2A 4QJ	1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM	Designed by NJ/GR	
File PO4.MDX	Checked by GT	
Innovyze	Network 2020.1	

Network Design Table for Proposed SW Network

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.001	19.640	0.304	64.6	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.002	41.236	0.271	152.2	0.017	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	19.613	0.131	149.7	0.077	5.00	0.0	0.600		o	150	Pipe/Conduit	
S4.001	29.396	0.294	100.0	0.054	0.00	0.0	0.600		o	150	Pipe/Conduit	
S4.002	6.222	0.200	31.1	0.020	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.003	1.806	0.045	40.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	24.715	0.247	100.1	0.014	5.00	0.0	0.600		o	225	Pipe/Conduit	
S5.001	10.503	0.105	100.0	0.012	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.002	45.225	0.452	100.1	0.040	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.003	21.936	0.219	100.2	0.013	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	36.015	0.655	55.0	0.023	5.00	0.0	0.600		o	225	Pipe/Conduit	
S6.001	36.514	0.548	66.6	0.023	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.004	4.411	0.044	100.3	0.030	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.005	1.380	0.014	98.6	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.006	1.380	0.014	98.6	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)
S3.001	50.00	9.02	32.550	0.098	0.0	0.0	0.0	1.25	22.1	13.3
S1.002	50.00	10.34	32.096	0.300	0.0	0.0	0.0	1.27	89.9	40.6
S4.000	50.00	5.40	32.600	0.077	0.0	0.0	0.0	0.82	14.5	10.4
S4.001	50.00	5.89	32.469	0.131	0.0	0.0	0.0	1.00	17.8	17.7
S4.002	50.00	5.93	32.100	0.151	0.0	0.0	0.0	2.35	93.6	20.4
S1.003	50.00	10.35	31.825	0.451	0.0	0.0	0.0	2.49	176.0	61.0
S5.000	50.00	5.32	31.820	0.014	0.0	0.0	0.0	1.31	52.0	1.8
S5.001	50.00	5.43	31.498	0.026	0.0	0.0	0.0	1.57	111.1	3.5
S5.002	50.00	5.91	31.393	0.066	0.0	0.0	0.0	1.57	111.1	8.9
S5.003	50.00	6.14	30.941	0.079	0.0	0.0	0.0	1.57	111.0	10.7
S6.000	50.00	5.34	32.000	0.023	0.0	0.0	0.0	1.77	70.3	3.2
S6.001	50.00	5.72	31.345	0.047	0.0	0.0	0.0	1.60	63.8	6.3
S5.004	50.00	6.19	30.722	0.155	0.0	0.0	0.0	1.57	111.0	21.0
S5.005	50.00	6.20	30.678	0.155	0.0	0.0	0.0	1.58	111.9	21.0
S5.006	50.00	6.21	30.664	0.155	0.0	0.0	0.0	1.58	111.9	21.0

Manhole Schedules for Proposed SW Network

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)
SCP08	33.100	0.600	Open Manhole	450	S1.000	32.500					
S09	33.400	1.156	Open Manhole	540	S1.001	32.244	300	S1.000	32.244		
SCP2	33.300	0.600	Open Manhole	450	S2.000	32.700	150				
S11	33.300	0.670	Open Manhole	450	S2.001	32.630	150	S2.000	32.630	150	
SCP18	33.500	0.500	Open Manhole	450	S3.000	33.000					
S17	33.450	0.900	Open Manhole	450	S3.001	32.550	150	S3.000	32.750		465
S12	33.400	1.304	Open Manhole	450	S1.002	32.096	300	S1.001	32.096	300	
								S2.001	32.246	150	
								S3.001	32.246	150	
SMUGA	33.000	0.400	Open Manhole	450	S4.000	32.600	150				
S13	33.315	0.846	Open Manhole	450	S4.001	32.469	150	S4.000	32.469	150	
S14	33.050	0.950	Open Manhole	1200	S4.002	32.100	225	S4.001	32.175	150	
STank 2	33.000	1.175	Open Manhole	1500	S1.003	31.825	300	S1.002	31.825	300	
								S4.002	31.900	225	
S	33.080	1.300	Open Manhole	0		OUTFALL		S1.003	31.780	300	
S02	32.500	0.680	Open Manhole	1200	S5.000	31.820	225				
S03	32.750	1.252	Open Manhole	1500	S5.001	31.498	300	S5.000	31.573	225	
S04	32.750	1.357	Open Manhole	1500	S5.002	31.393	300	S5.001	31.393	300	
S05	32.550	1.609	Open Manhole	1500	S5.003	30.941	300	S5.002	30.941	300	
S06	33.000	1.000	Open Manhole	1200	S6.000	32.000	225				
S06A	32.600	1.255	Open Manhole	1200	S6.001	31.345	225	S6.000	31.345	225	
S07	32.420	1.698	Open Manhole	1500	S5.004	30.722	300	S5.003	30.722	300	
								S6.001	30.797	225	
STank 1	32.420	1.742	Open Manhole	1500	S5.005	30.678	300	S5.004	30.678	300	
S14	32.420	1.756	Open Manhole	1500	S5.006	30.664	300	S5.005	30.664	300	
S	32.420	1.770	Open Manhole	0		OUTFALL		S5.006	30.650	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SCP08	506524.330	181665.929	506524.330	181665.929	Required	
S09	506518.543	181703.838	506518.543	181703.838	Required	
SCP2	506526.933	181719.702	506526.933	181719.702	Required	
S11	506516.576	181718.299	506516.576	181718.299	Required	
SCP18	506539.656	181668.398	506539.656	181668.398	Required	
S17	506534.436	181705.485	506534.436	181705.485	Required	

Manhole Schedules for Proposed SW Network

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S12	506517.066	181714.652	506517.066	181714.652	Required	
SMUGA	506503.321	181727.076	506503.321	181727.076	Required	
S13	506506.337	181707.696	506506.337	181707.696	Required	
S14	506477.251	181703.441	506477.251	181703.441	Required	
STank 2	506476.146	181709.564	506476.146	181709.564	Required	
S	506474.721	181710.674			No Entry	
S02	506525.818	181626.729	506525.818	181626.729	Required	
S03	506501.320	181623.464	506501.320	181623.464	Required	
S04	506496.104	181632.580	506496.104	181632.580	Required	
S05	506451.340	181626.140	506451.340	181626.140	Required	
S06	506520.021	181658.670	506520.021	181658.670	Required	
S06A	506484.418	181653.242	506484.418	181653.242	Required	
S07	506448.302	181647.864	506448.302	181647.864	Required	
STank 1	506447.984	181652.263	506447.984	181652.263	Required	
S14	506447.757	181653.624	506447.757	181653.624	Required	
S	506447.531	181654.985			No Entry	

AKS Ward Limited		Page 5
10 Bonhill Street London EC2A 4QJ	X192068 Meadow High School Proposed SW Network 1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM File PO4.MDX	Designed by NJ/GR Checked by GT	
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Proposed SW Network

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	→ ↓ →		SCP08	33.100	32.500	0.300	Open Manhole	450
S1.001	o	300	S09	33.400	32.244	0.856	Open Manhole	540
S2.000	o	150	SCP2	33.300	32.700	0.450	Open Manhole	450
S2.001	o	150	S11	33.300	32.630	0.520	Open Manhole	450
S3.000	→ ↓ →		SCP18	33.500	33.000	0.085	Open Manhole	450
S3.001	o	150	S17	33.450	32.550	0.750	Open Manhole	450
S1.002	o	300	S12	33.400	32.096	1.004	Open Manhole	450
S4.000	o	150	SMUGA	33.000	32.600	0.250	Open Manhole	450
S4.001	o	150	S13	33.315	32.469	0.696	Open Manhole	450
S4.002	o	225	S14	33.050	32.100	0.725	Open Manhole	1200
S1.003	o	300	STank 2	33.000	31.825	0.875	Open Manhole	1500
S5.000	o	225	S02	32.500	31.820	0.455	Open Manhole	1200
S5.001	o	300	S03	32.750	31.498	0.952	Open Manhole	1500
S5.002	o	300	S04	32.750	31.393	1.057	Open Manhole	1500
S5.003	o	300	S05	32.550	30.941	1.309	Open Manhole	1500
S6.000	o	225	S06	33.000	32.000	0.775	Open Manhole	1200
S6.001	o	225	S06A	32.600	31.345	1.030	Open Manhole	1200
S5.004	o	300	S07	32.420	30.722	1.398	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	38.348	149.8	S09	33.400	32.244	0.856	Open Manhole	540
S1.001	10.914	73.7	S12	33.400	32.096	1.004	Open Manhole	450
S2.000	10.451	149.3	S11	33.300	32.630	0.520	Open Manhole	450
S2.001	3.680	9.6	S12	33.400	32.246	1.004	Open Manhole	450
S3.000	37.453	149.8	S17	33.450	32.750	0.285	Open Manhole	450
S3.001	19.640	64.6	S12	33.400	32.246	1.004	Open Manhole	450
S1.002	41.236	152.2	STank 2	33.000	31.825	0.875	Open Manhole	1500
S4.000	19.613	149.7	S13	33.315	32.469	0.696	Open Manhole	450
S4.001	29.396	100.0	S14	33.050	32.175	0.725	Open Manhole	1200
S4.002	6.222	31.1	STank 2	33.000	31.900	0.875	Open Manhole	1500
S1.003	1.806	40.1	S	33.080	31.780	1.000	Open Manhole	0
S5.000	24.715	100.1	S03	32.750	31.573	0.952	Open Manhole	1500
S5.001	10.503	100.0	S04	32.750	31.393	1.057	Open Manhole	1500
S5.002	45.225	100.1	S05	32.550	30.941	1.309	Open Manhole	1500
S5.003	21.936	100.2	S07	32.420	30.722	1.398	Open Manhole	1500
S6.000	36.015	55.0	S06A	32.600	31.345	1.030	Open Manhole	1200
S6.001	36.514	66.6	S07	32.420	30.797	1.398	Open Manhole	1500
S5.004	4.411	100.3	STank 1	32.420	30.678	1.442	Open Manhole	1500

AKS Ward Limited		Page 6
10 Bonhill Street London EC2A 4QJ	X192068 Meadow High School Proposed SW Network 1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM File PO4.MDX	Designed by NJ/GR Checked by GT	
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Proposed SW Network

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)
S5.005	o	300	STank 1	32.420	30.678	1.442	Open Manhole	1500
S5.006	o	300	S14	32.420	30.664	1.456	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S5.005	1.380	98.6	S14	32.420	30.664	1.456	Open Manhole	1500
S5.006	1.380	98.6	S	32.420	30.650	1.470	Open Manhole	0

Setting Out Information - True Coordinates (Proposed SW Network)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S5.006	S14	1500		506447.757	181653.624	506447.757	181653.624	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.003	S	0		506474.721	181710.674	
S5.006	S	0		506447.531	181654.985	

AKS Ward Limited		Page 9
10 Bonhill Street London EC2A 4QJ	X192068 Meadow High School Proposed SW Network 1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM	Designed by NJ/GR	
File PO4.MDX	Checked by GT	
Innovyze	Network 2020.1	

Area Summary for Proposed SW Network

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.117	0.117	0.117
1.001	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.068	0.068	0.068
2.001	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.098	0.098	0.098
3.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.017	0.017	0.017
4.000	User	-	100	0.062	0.062	0.062
	User	-	100	0.015	0.015	0.077
4.001	User	-	100	0.041	0.041	0.041
	User	-	100	0.013	0.013	0.054
4.002	User	-	100	0.013	0.013	0.013
	User	-	100	0.007	0.007	0.020
1.003	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.014	0.014	0.014
5.001	User	-	100	0.012	0.012	0.012
5.002	User	-	100	0.040	0.040	0.040
5.003	User	-	100	0.013	0.013	0.013
6.000	User	-	100	0.023	0.023	0.023
6.001	User	-	100	0.023	0.023	0.023
5.004	User	-	100	0.030	0.030	0.030
5.005	-	-	100	0.000	0.000	0.000
5.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.606	0.606	0.606

Free Flowing Outfall Details for Proposed SW Network

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

S1.003	S	33.080	31.780	0.000	0	0
--------	---	--------	--------	-------	---	---

Free Flowing Outfall Details for Proposed SW Network

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

S5.006	S	32.420	30.650	0.000	0	0
--------	---	--------	--------	-------	---	---

Simulation Criteria for Proposed SW Network

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 Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	1	Number of Time/Area Diagrams	0
Number of Online Controls	5	Number of Storage Structures	6	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000
Return Period (years)	100	Ratio R	0.400
Region England and Wales		Profile Type	Summer

AKS Ward Limited		Page 10
10 Bonhill Street London EC2A 4QJ	X192068 Meadow High School Proposed SW Network 1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM File PO4.MDX	Designed by NJ/GR Checked by GT	
Innovyze	Network 2020.1	

Synthetic Rainfall Details

Cv (Summer) 0.750 Storm Duration (mins) 30
Cv (Winter) 0.840

AKS Ward Limited		Page 11
10 Bonhill Street London EC2A 4QJ	X192068 Meadow High School Proposed SW Network 1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM	Designed by NJ/GR	
File PO4.MDX	Checked by GT	
Innovyze	Network 2020.1	

Online Controls for Proposed SW Network

Orifice Manhole: S09, DS/PN: S1.001, Volume (m³): 48.0

Diameter (m) 0.080 Discharge Coefficient 0.600 Invert Level (m) 32.244

Orifice Manhole: S11, DS/PN: S2.001, Volume (m³): 0.3

Diameter (m) 0.060 Discharge Coefficient 0.600 Invert Level (m) 32.630

Orifice Manhole: S17, DS/PN: S3.001, Volume (m³): 41.6

Diameter (m) 0.030 Discharge Coefficient 0.600 Invert Level (m) 32.550

Complex Manhole: STank 2, DS/PN: S1.003, Volume (m³): 5.1

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0067-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	67
Invert Level (m)	31.825
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.0	Kick-Flo®	0.599	1.6
Flush-Flo™	0.296	1.9	Mean Flow over Head Range	-	1.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	0.800	1.8	2.000	2.7	4.000	3.8	7.000	4.9
0.200	1.9	1.000	2.0	2.200	2.9	4.500	4.0	7.500	5.1
0.300	1.9	1.200	2.2	2.400	3.0	5.000	4.2	8.000	5.2
0.400	1.9	1.400	2.3	2.600	3.1	5.500	4.4	8.500	5.4
0.500	1.8	1.600	2.5	3.000	3.3	6.000	4.6	9.000	5.5
0.600	1.6	1.800	2.6	3.500	3.5	6.500	4.7	9.500	5.7

Orifice

Diameter (m) 0.065 Discharge Coefficient 0.600 Invert Level (m) 32.400

Pump Manhole: S14, DS/PN: S5.006, Volume (m³): 3.1

Invert Level (m) 30.664

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)
0.200	0.0000	0.800	0.0000	1.400	0.0000	2.000	0.0000	2.600	0.0000
0.400	0.0000	1.000	0.0000	1.600	0.0000	2.200	0.0000	2.800	0.0000
0.600	0.0000	1.200	0.0000	1.800	0.0000	2.400	0.0000	3.000	0.0000

Pump Manhole: S14, DS/PN: S5.006, Volume (m³): 3.1

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)
3.200	0.0000	3.800	0.0000	4.400	0.0000	5.000	0.0000	5.600	0.0000
3.400	0.0000	4.000	0.0000	4.600	0.0000	5.200	0.0000	5.800	0.0000
3.600	0.0000	4.200	0.0000	4.800	0.0000	5.400	0.0000	6.000	0.0000

Offline Controls for Proposed SW Network

Pump Manhole: STank 1, DS/PN: S5.005, Loop to PN: S1.002

Invert Level (m) 30.678

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)
0.200	2.0000	1.400	2.0000	2.600	2.0000	3.800	2.0000	5.000	2.0000
0.400	2.0000	1.600	2.0000	2.800	2.0000	4.000	2.0000	5.200	2.0000
0.600	2.0000	1.800	2.0000	3.000	2.0000	4.200	2.0000	5.400	2.0000
0.800	2.0000	2.000	2.0000	3.200	2.0000	4.400	2.0000	5.600	2.0000
1.000	2.0000	2.200	2.0000	3.400	2.0000	4.600	2.0000	5.800	2.0000
1.200	2.0000	2.400	2.0000	3.600	2.0000	4.800	2.0000	6.000	2.0000

Storage Structures for Proposed SW Network

Porous Car Park Pipe: S1.000

Manning's N	0.075	Width (m)	14.0
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	38.3
Membrane Percolation (mm/hr)	1000	Slope (1:X)	149.8
Max Percolation (l/s)	149.1	Depression Storage (mm)	5
Safety Factor	2.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	300
Invert Level (m)	32.500		

Porous Car Park Manhole: SCP2, DS/PN: S2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.5
Membrane Percolation (mm/hr)	1000	Length (m)	43.5
Max Percolation (l/s)	163.1	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	32.700	Cap Volume Depth (m)	0.400

Porous Car Park Pipe: S3.000

Manning's N	0.075	Width (m)	9.0
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	37.5
Membrane Percolation (mm/hr)	1000	Slope (1:X)	149.8
Max Percolation (l/s)	93.6	Depression Storage (mm)	5
Safety Factor	2.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	85
Invert Level (m)	33.000		

Porous Car Park Manhole: SMUGA, DS/PN: S4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	18.0
Membrane Percolation (mm/hr)	1000	Length (m)	36.8
Max Percolation (l/s)	184.0	Slope (1:X)	92.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	32.600	Cap Volume Depth (m)	0.300

Cellular Storage Manhole: STank 2, DS/PN: S1.003

Invert Level (m)	31.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	600.0	600.0	0.400	600.0	684.8	0.401	0.0	684.8

Cellular Storage Manhole: STank 1, DS/PN: S5.005

Invert Level (m)	30.678	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	299.0	299.0	0.800	299.0	354.3	0.801	0.0	357.8

AKS Ward Limited		Page 15
10 Bonhill Street London EC2A 4QJ	X192068 Meadow High School Proposed SW Network 1% AEP plus 40% CC	
Date 11/26/2020 6:29 PM File PO4.MDX	Designed by NJ/GR Checked by GT	
Innovyze	Network 2020.1	

Manhole Headloss for Proposed SW Network

PN	US/MH Name	US/MH Headloss
S1.000	SCP08	0.500
S1.001	S09	0.500
S2.000	SCP2	0.500
S2.001	S11	0.500
S3.000	SCP18	0.500
S3.001	S17	0.500
S1.002	S12	0.500
S4.000	SMUGA	0.500
S4.001	S13	0.500
S4.002	S14	0.500
S1.003	STank 2	0.500
S5.000	S02	0.500
S5.001	S03	0.500
S5.002	S04	0.500
S5.003	S05	0.500
S6.000	S06	0.500
S6.001	S06A	0.500
S5.004	S07	0.500
S5.005	STank 1	0.500
S5.006	S14	0.500

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

Simulation Criteria

Areal Reduction Factor 1.000	Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0	MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0	Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500	Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000	
Number of Input Hydrographs 0	Number of Offline Controls 1
Number of Online Controls 5	Number of Storage Structures 6
	Number of Time/Area Diagrams 0
	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 0.400	Cv (Winter) 1.000
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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080	
Return Period(s) (years)		100
Climate Change (%)		40

										Water Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)
S1.000	SCP08	1440 Winter	100	+40%	100/30 Summer	100/60 Summer			33.125	0.325
S1.001	S09	960 Summer	100	+40%	100/15 Summer	100/60 Summer			33.400	0.856
S2.000	SCP2	60 Summer	100	+40%	100/15 Summer				33.178	0.328
S2.001	S11	60 Winter	100	+40%	100/15 Summer				33.214	0.434
S3.000	SCP18	120 Winter	100	+40%	100/30 Summer	100/30 Summer			33.465	0.050
S3.001	S17	240 Winter	100	+40%	100/15 Summer	100/30 Summer			33.461	0.761
S1.002	S12	960 Winter	100	+40%	100/60 Summer				32.928	0.532
S4.000	SMUGA	30 Summer	100	+40%	100/15 Summer				32.925	0.175
S4.001	S13	15 Summer	100	+40%	100/15 Summer				33.094	0.475
S4.002	S14	1440 Winter	100	+40%	100/60 Summer				32.916	0.591
S1.003	STank 2	1440 Winter	100	+40%	100/15 Summer				32.920	0.795
S5.000	S02	15 Summer	100	+40%					31.892	-0.153
S5.001	S03	15 Summer	100	+40%					31.602	-0.196
S5.002	S04	15 Summer	100	+40%					31.551	-0.142
S5.003	S05	15 Summer	100	+40%	100/15 Summer				31.331	0.090
S6.000	S06	15 Summer	100	+40%					32.081	-0.144
S6.001	S06A	15 Summer	100	+40%					31.477	-0.093
S5.004	S07	15 Summer	100	+40%	100/15 Summer				31.194	0.172
S5.005	STank 1	360 Winter	100	+40%	100/120 Summer		100/15 Summer	38	31.045	0.067
S5.006	S14	360 Winter	100	+40%	100/120 Summer				31.045	0.081

		Flooded			Half Drain		Pipe		
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded	
S1.000	SCP08	37.547	0.07		436	11.8	FLOOD	21	
S1.001	S09	0.207	0.11			10.5	FLOOD	17	
S2.000	SCP2	0.000	0.41		53	5.3	FLOOD RISK		
S2.001	S11	0.000	0.13			5.2	FLOOD RISK		
S3.000	SCP18	3.250	0.07		253	13.1	FLOOD		

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

PN	US/MH Name	Flooded		Half Drain		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)		
S3.001	S17	11.112	0.09			1.8	FLOOD	20
S1.002	S12	0.000	0.14			11.7	SURCHARGED	
S4.000	SMUGA	0.000	1.32		20	17.9	FLOOD RISK	
S4.001	S13	0.000	1.59			27.1	FLOOD RISK	
S4.002	S14	0.000	0.09			5.4	FLOOD RISK	
S1.003	STank 2	0.000	0.13		2432	8.1	FLOOD RISK	
S5.000	S02	0.000	0.22			10.7	OK	
S5.001	S03	0.000	0.26			21.1	OK	
S5.002	S04	0.000	0.53			55.1	OK	
S5.003	S05	0.000	0.63			61.7	SURCHARGED	
S6.000	S06	0.000	0.27			18.2	OK	
S6.001	S06A	0.000	0.63			38.0	OK	
S5.004	S07	0.000	1.95			119.8	SURCHARGED	
S5.005	STank 1	0.000	0.00	2.0	468	0.1	SURCHARGED	
S5.006	S14	0.000	0.00			0.0	SURCHARGED	