

The Alan Johnston Partnership		Page 1
1 Dale Street Liverpool L2 2ET	224-181 STAND GOLF CLUB SITE A SW NETWORK RESULTS	
Date 15/08/2025 16:10 File SW NETWORK.MDX	Designed by JJR Checked by JP	
XP Solutions	Network 2019.1	

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)	2	PIMP (%)	100
M5-60 (mm)	18.900	Add Flow / Climate Change (%)	0
Ratio R	0.326	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.585	4-8	0.201

Total Area Contributing (ha) = 0.786

Total Pipe Volume (m³) = 152.739

Network Design Table for Storm

« - 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	22.397	0.225	99.5	0.047	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	31.866	0.135	236.0	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	9.230	0.010	923.0	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	9.231	0.010	923.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	10.940	0.045	243.1	0.046	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	13.428	0.270	49.7	0.000	5.00	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	50.00	5.24	106.250	0.047	0.0	0.0	0.0	1.58	111.4	6.4
1.001	50.00	5.76	106.025	0.078	0.0	0.0	0.0	1.02	72.0	10.6
1.002	50.00	6.06	105.890	0.132	0.0	0.0	0.0	0.51	36.0	17.9
1.003	50.00	6.36	105.880	0.132	0.0	0.0	0.0	0.51	36.0	17.9
1.004	50.00	6.54	105.870	0.178	0.0	0.0	0.0	1.00	71.0	24.1
2.000	50.00	5.16	106.245	0.000	0.0	0.0	0.0	1.43	25.3	0.0

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Liverpool	STAND GOLF CLUB SITE A	
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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)	Section Type	Auto Design
1.005	12.366	0.150	82.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	12.444	0.035	355.5	0.016	0.00	0.0	0.600	o	1350	Pipe/Conduit	
3.000	17.981	0.045	399.6	0.056	5.00	0.0	0.600	o	750	Pipe/Conduit	
3.001	9.266	0.095	97.5	0.037	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	13.739	0.140	98.1	0.056	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	13.969	0.140	99.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	11.066	0.110	100.6	0.057	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.005	26.630	0.070	380.4	0.098	0.00	0.0	0.600	o	1200	Pipe/Conduit	
3.006	10.192	0.100	101.9	0.053	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.007	18.852	0.050	377.0	0.055	0.00	0.0	0.600	o	1200	Pipe/Conduit	
3.008	18.075	0.045	400.0	0.063	0.00	0.0	0.600	o	1200	Pipe/Conduit	
4.000	12.270	0.035	350.6	0.000	5.00	0.0	0.600	o	1200	Pipe/Conduit	
3.009	22.024	0.055	400.4	0.075	0.00	0.0	0.600	o	1350	Pipe/Conduit	
1.007	9.030	0.090	100.3	0.042	0.00	0.0	0.600	o	225	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)
1.005	50.00	6.66	105.825	0.178	0.0	0.0	0.0	1.73	122.5	24.1
1.006	50.00	6.76	104.625	0.194	0.0	0.0	0.0	2.13	3044.6	26.3
3.000	50.00	5.22	112.895	0.056	0.0	0.0	0.0	1.39	615.7	7.6
3.001	50.00	5.33	112.850	0.093	0.0	0.0	0.0	1.32	52.6	12.6
3.002	50.00	5.51	112.755	0.149	0.0	0.0	0.0	1.32	52.5	20.2
3.003	50.00	5.68	111.650	0.149	0.0	0.0	0.0	1.31	52.0	20.2
3.004	50.00	5.82	111.510	0.206	0.0	0.0	0.0	1.30	51.8	27.9
3.005	50.00	6.06	107.835	0.304	0.0	0.0	0.0	1.91	2162.5	41.2
3.006	50.00	6.19	107.765	0.357	0.0	0.0	0.0	1.29	51.5	48.3
3.007	50.00	6.35	104.890	0.412	0.0	0.0	0.0	1.92	2172.3	55.8
3.008	50.00	6.51	104.840	0.475	0.0	0.0	0.0	1.86	2108.6	64.3
4.000	50.00	5.10	104.830	0.000	0.0	0.0	0.0	1.99	2253.3	0.0
3.009	50.00	6.70	104.645	0.550	0.0	0.0	0.0	2.00	2867.8	74.5
1.007	50.00	6.88	104.590	0.786	0.0	0.0	0.0	1.31	51.9«	106.4

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SW50	108.225	1.975	Open Manhole	600	1.000	106.250	300				
SW51	108.225	2.200	Open Manhole	1500	1.001	106.025	300	1.000	106.025	300	
SW52	108.170	2.280	Open Manhole	1500	1.002	105.890	300	1.001	105.890	300	
TANK	108.100	2.220	Open Manhole	1200	1.003	105.880	300	1.002	105.880	300	
SW53	108.100	2.230	Open Manhole	1500	1.004	105.870	300	1.003	105.870	300	
SW54	108.225	1.980	Open Manhole	600	2.000	106.245	150				
SW55	108.225	2.400	Open Manhole	1500	1.005	105.825	300	1.004	105.825	300	
								2.000	105.975	150	
12	108.200	3.575	Open Manhole	3000	1.006	104.625	1350	1.005	105.675	300	
1	116.150	3.255	Open Manhole	3000	3.000	112.895	750				
2	115.410	2.560	Open Manhole	3000	3.001	112.850	225	3.000	112.850	750	
3	114.790	2.035	Open Manhole	1350	3.002	112.755	225	3.001	112.755	225	
4	114.090	2.440	Open Manhole	1350	3.003	111.650	225	3.002	112.615	225	965
5	113.370	1.860	Open Manhole	1350	3.004	111.510	225	3.003	111.510	225	
6	112.820	4.985	Open Manhole	3000	3.005	107.835	1200	3.004	111.400	225	2590
7	111.500	3.735	Open Manhole	3000	3.006	107.765	225	3.005	107.765	1200	
8	111.000	6.110	Open Manhole	3000	3.007	104.890	1200	3.006	107.665	225	1800
9	110.050	5.210	Open Manhole	3000	3.008	104.840	1200	3.007	104.840	1200	
10	109.700	4.870	Open Manhole	3000	4.000	104.830	1200				
11	109.100	4.455	Open Manhole	3000	3.009	104.645	1350	3.008	104.795	1200	
								4.000	104.795	1200	
13	108.200	3.610	Open Manhole	3000	1.007	104.590	225	1.006	104.590	1350	
								3.009	104.590	1350	
	108.000	3.500	Open Manhole	1200		OUTFALL		1.007	104.500	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW50	379812.861	406274.950	379812.861	406274.950	Required	
SW51	379830.326	406260.928	379830.326	406260.928	Required	
SW52	379810.420	406236.044	379810.420	406236.044	Required	
TANK	379817.628	406230.279	379817.628	406230.279	Required	
SW53	379824.837	406224.514	379824.837	406224.514	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW54	379809.618	406205.483	379809.618	406205.483	Required	
SW55	379818.004	406215.970	379818.004	406215.970	Required	
12	379827.662	406208.247	379827.662	406208.247	Required	
1	379960.096	406130.572	379960.096	406130.572	Required	
2	379944.931	406120.911	379944.931	406120.911	Required	
3	379936.255	406117.658	379936.255	406117.658	Required	
4	379922.532	406117.003	379922.532	406117.003	Required	
5	379909.382	406121.717	379909.382	406121.717	Required	
6	379900.866	406128.627	379900.866	406128.627	Required	
7	379882.979	406148.356	379882.979	406148.356	Required	
8	379876.010	406155.740	379876.010	406155.740	Required	
9	379862.762	406169.152	379862.762	406169.152	Required	
10	379859.969	406190.957	379859.969	406190.957	Required	
11	379850.851	406182.747	379850.851	406182.747	Required	
13	379835.989	406199.000	379835.989	406199.000	Required	
	379842.699	406205.043			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	SW50	108.225	106.250	1.675	Open Manhole	600
1.001	o	300	SW51	108.225	106.025	1.900	Open Manhole	1500
1.002	o	300	SW52	108.170	105.890	1.980	Open Manhole	1500
1.003	o	300	TANK	108.100	105.880	1.920	Open Manhole	1200
1.004	o	300	SW53	108.100	105.870	1.930	Open Manhole	1500
2.000	o	150	SW54	108.225	106.245	1.830	Open Manhole	600
1.005	o	300	SW55	108.225	105.825	2.100	Open Manhole	1500
1.006	o	1350	12	108.200	104.625	2.225	Open Manhole	3000
3.000	o	750	1	116.150	112.895	2.505	Open Manhole	3000
3.001	o	225	2	115.410	112.850	2.335	Open Manhole	3000
3.002	o	225	3	114.790	112.755	1.810	Open Manhole	1350
3.003	o	225	4	114.090	111.650	2.215	Open Manhole	1350
3.004	o	225	5	113.370	111.510	1.635	Open Manhole	1350
3.005	o	1200	6	112.820	107.835	3.785	Open Manhole	3000
3.006	o	225	7	111.500	107.765	3.510	Open Manhole	3000
3.007	o	1200	8	111.000	104.890	4.910	Open Manhole	3000
3.008	o	1200	9	110.050	104.840	4.010	Open Manhole	3000
4.000	o	1200	10	109.700	104.830	3.670	Open Manhole	3000

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	22.397	99.5	SW51	108.225	106.025	1.900	Open Manhole	1500
1.001	31.866	236.0	SW52	108.170	105.890	1.980	Open Manhole	1500
1.002	9.230	923.0	TANK	108.100	105.880	1.920	Open Manhole	1200
1.003	9.231	923.1	SW53	108.100	105.870	1.930	Open Manhole	1500
1.004	10.940	243.1	SW55	108.225	105.825	2.100	Open Manhole	1500
2.000	13.428	49.7	SW55	108.225	105.975	2.100	Open Manhole	1500
1.005	12.366	82.4	12	108.200	105.675	2.225	Open Manhole	3000
1.006	12.444	355.5	13	108.200	104.590	2.260	Open Manhole	3000
3.000	17.981	399.6	2	115.410	112.850	1.810	Open Manhole	3000
3.001	9.266	97.5	3	114.790	112.755	1.810	Open Manhole	1350
3.002	13.739	98.1	4	114.090	112.615	1.250	Open Manhole	1350
3.003	13.969	99.8	5	113.370	111.510	1.635	Open Manhole	1350
3.004	11.066	100.6	6	112.820	111.400	1.195	Open Manhole	3000
3.005	26.630	380.4	7	111.500	107.765	2.535	Open Manhole	3000
3.006	10.192	101.9	8	111.000	107.665	3.110	Open Manhole	3000
3.007	18.852	377.0	9	110.050	104.840	4.010	Open Manhole	3000
3.008	18.075	400.0	11	109.100	104.795	3.105	Open Manhole	3000
4.000	12.270	350.6	11	109.100	104.795	3.105	Open Manhole	3000

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.009	o	1350	11	109.100	104.645	3.105	Open Manhole	3000
1.007	o	225	13	108.200	104.590	3.385	Open Manhole	3000

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)
3.009	22.024	400.4	13	108.200	104.590	2.260	Open Manhole	3000
1.007	9.030	100.3		108.000	104.500	3.275	Open Manhole	1200

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	SW50	300	1.675	1.900	Unclassified	600	0	1.675	Unclassified
1.001	SW51	300	1.900	1.980	Unclassified	1500	0	1.900	Unclassified
1.002	SW52	300	1.920	1.980	Unclassified	1500	0	1.980	Unclassified
1.003	TANK	300	1.920	1.930	Unclassified	1200	0	1.920	Unclassified
1.004	SW53	300	1.930	2.100	Unclassified	1500	0	1.930	Unclassified
2.000	SW54	150	1.830	2.100	Unclassified	600	0	1.830	Unclassified
1.005	SW55	300	2.100	2.225	Unclassified	1500	0	2.100	Unclassified
1.006	12	1350	2.225	2.260	Unclassified	3000	0	2.225	Unclassified
3.000	1	750	1.810	2.505	Unclassified	3000	0	2.505	Unclassified
3.001	2	225	1.810	2.335	Unclassified	3000	0	2.335	Unclassified
3.002	3	225	1.250	1.810	Unclassified	1350	0	1.810	Unclassified
3.003	4	225	1.635	2.215	Unclassified	1350	0	2.215	Unclassified
3.004	5	225	1.195	1.635	Unclassified	1350	0	1.635	Unclassified
3.005	6	1200	2.535	3.785	Unclassified	3000	0	3.785	Unclassified
3.006	7	225	3.110	3.510	Unclassified	3000	0	3.510	Unclassified
3.007	8	1200	4.010	4.910	Unclassified	3000	0	4.910	Unclassified
3.008	9	1200	3.105	4.010	Unclassified	3000	0	4.010	Unclassified
4.000	10	1200	3.105	3.670	Unclassified	3000	0	3.670	Unclassified
3.009	11	1350	2.260	3.105	Unclassified	3000	0	3.105	Unclassified
1.007	13	225	3.275	3.385	Unclassified	3000	0	3.385	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Name	Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007		108.000	104.500	105.000	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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	0
Number of Online Controls	4	Number of Storage Structures	3
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.900	Storm Duration (mins)	30
Ratio R	0.326		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW55, DS/PN: 1.005, Volume (m³): 5.1

Unit Reference MD-SHE-0100-5000-1400-5000

Design Head (m) 1.400

Design Flow (l/s) 5.0

Flush-Flo™ Calculated

Objective Minimise upstream storage

Application Surface

Sump Available Yes

Diameter (mm) 100

Invert Level (m) 105.825

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)	1.400	5.0	Kick-Flo®	0.855	4.0
Flush-Flo™	0.416	5.0	Mean Flow over Head Range	-	4.4

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.800	4.3	2.000	5.9	4.000	8.2	7.000	10.7
0.200	4.6	1.000	4.3	2.200	6.2	4.500	8.6	7.500	11.0
0.300	4.9	1.200	4.7	2.400	6.4	5.000	9.1	8.000	11.4
0.400	5.0	1.400	5.0	2.600	6.7	5.500	9.5	8.500	11.7
0.500	5.0	1.600	5.3	3.000	7.1	6.000	9.9	9.000	12.0
0.600	4.9	1.800	5.6	3.500	7.7	6.500	10.3	9.500	12.3

Hydro-Brake® Optimum Manhole: 2, DS/PN: 3.001, Volume (m³): 24.7

Unit Reference MD-SHE-0100-5000-1400-5000

Design Head (m) 1.400

Design Flow (l/s) 5.0

Flush-Flo™ Calculated

Objective Minimise upstream storage

Application Surface

Sump Available Yes

Diameter (mm) 100

Invert Level (m) 112.850

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)	1.400	5.0	Kick-Flo®	0.855	4.0
Flush-Flo™	0.416	5.0	Mean Flow over Head Range	-	4.4

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

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Hydro-Brake® Optimum Manhole: 2, DS/PN: 3.001, Volume (m³): 24.7

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.800	4.3	2.000	5.9	4.000	8.2	7.000	10.7
0.200	4.6	1.000	4.3	2.200	6.2	4.500	8.6	7.500	11.0
0.300	4.9	1.200	4.7	2.400	6.4	5.000	9.1	8.000	11.4
0.400	5.0	1.400	5.0	2.600	6.7	5.500	9.5	8.500	11.7
0.500	5.0	1.600	5.3	3.000	7.1	6.000	9.9	9.000	12.0
0.600	4.9	1.800	5.6	3.500	7.7	6.500	10.3	9.500	12.3

Hydro-Brake® Optimum Manhole: 7, DS/PN: 3.006, Volume (m³): 53.1

Unit Reference	MD-SHE-0155-1300-1600-1300
Design Head (m)	1.600
Design Flow (l/s)	13.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	155
Invert Level (m)	107.765
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	13.0	Kick-Flo®	0.998	10.4
Flush-Flo™	0.468	13.0	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)	Depth (m)	Flow (l/s)
0.100	5.6	0.800	12.2	2.000	14.4	4.000	20.1	7.000	26.3
0.200	11.6	1.000	10.4	2.200	15.1	4.500	21.3	7.500	27.2
0.300	12.6	1.200	11.3	2.400	15.7	5.000	22.4	8.000	28.0
0.400	12.9	1.400	12.2	2.600	16.4	5.500	23.4	8.500	28.9
0.500	13.0	1.600	13.0	3.000	17.5	6.000	24.4	9.000	29.7
0.600	12.8	1.800	13.7	3.500	18.8	6.500	25.4	9.500	30.5

Hydro-Brake® Optimum Manhole: 13, DS/PN: 1.007, Volume (m³): 66.3

Unit Reference	MD-SHE-0120-1080-3400-1080
Design Head (m)	3.400
Design Flow (l/s)	10.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	120
Invert Level (m)	104.590
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: 13, DS/PN: 1.007, Volume (m³): 66.3

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.400	10.8	Kick-Flo®	1.068	6.3
Flush-Flo™	0.520	7.9	Mean Flow over Head Range	-	8.1

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	4.2	0.800	7.6	2.000	8.4	4.000	11.7	7.000	15.2
0.200	6.8	1.000	6.8	2.200	8.8	4.500	12.3	7.500	15.7
0.300	7.5	1.200	6.6	2.400	9.2	5.000	13.0	8.000	16.2
0.400	7.8	1.400	7.1	2.600	9.5	5.500	13.6	8.500	16.7
0.500	7.9	1.600	7.6	3.000	10.2	6.000	14.1	9.000	17.2
0.600	7.9	1.800	8.0	3.500	10.9	6.500	14.7	9.500	17.6

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Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 1.003

Invert Level (m) 106.280 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	202.5	0.0	1.200	202.5	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 7, DS/PN: 3.006

Invert Level (m) 109.850 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	50.0	0.0	0.800	50.0	0.0	0.801	0.0	0.0

Cellular Storage Manhole: 13, DS/PN: 1.007

Invert Level (m) 106.950 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	135.0	0.0	0.800	135.0	0.0	0.801	0.0	0.0

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 1.000
 Region England and Wales Ratio R 0.326 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	SW50	60 Summer	1	+0%	30/360 Summer				106.305	-0.245	0.000
1.001	SW51	60 Summer	1	+0%	30/15 Summer				106.295	-0.030	0.000
1.002	SW52	60 Summer	1	+0%	1/15 Summer				106.291	0.101	0.000
1.003	TANK	60 Summer	1	+0%	1/15 Summer				106.288	0.108	0.000
1.004	SW53	60 Summer	1	+0%	1/15 Summer				106.287	0.117	0.000
2.000	SW54	60 Summer	1	+0%	30/60 Summer				106.283	-0.112	0.000
1.005	SW55	60 Summer	1	+0%	1/15 Summer				106.284	0.159	0.000
1.006	12	240 Summer	1	+0%	30/60 Summer				105.476	-0.499	0.000
3.000	1	30 Summer	1	+0%	100/15 Summer				113.084	-0.561	0.000
3.001	2	30 Summer	1	+0%	1/30 Summer				113.083	0.008	0.000
3.002	3	15 Summer	1	+0%	100/15 Summer				112.832	-0.148	0.000
3.003	4	30 Summer	1	+0%	100/15 Summer				111.727	-0.148	0.000
3.004	5	15 Summer	1	+0%	30/15 Summer				111.613	-0.122	0.000
3.005	6	60 Summer	1	+0%	30/30 Summer				108.255	-0.780	0.000
3.006	7	60 Summer	1	+0%	1/15 Summer				108.253	0.263	0.000
3.007	8	240 Summer	1	+0%	30/120 Summer				105.476	-0.614	0.000
3.008	9	240 Summer	1	+0%	30/120 Summer				105.476	-0.564	0.000
4.000	10	240 Summer	1	+0%	30/120 Summer				105.476	-0.554	0.000
3.009	11	240 Summer	1	+0%	30/60 Summer				105.476	-0.519	0.000
1.007	13	240 Summer	1	+0%	1/15 Summer				105.476	0.661	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
				Flow (l/s)		Exceeded
1.000	SW50	0.05		5.3		OK
1.001	SW51	0.11		7.1		OK
1.002	SW52	0.26		8.4	SURCHARGED	
1.003	TANK	0.16		5.1	SURCHARGED	
1.004	SW53	0.13		7.4	SURCHARGED	
2.000	SW54	0.00		0.0		OK
1.005	SW55	0.05		5.0	SURCHARGED	
1.006	12	0.00		4.7		OK
3.000	1	0.01		5.3		OK
3.001	2	0.11		4.7	SURCHARGED	
3.002	3	0.25		11.4		OK
3.003	4	0.25		11.4		OK
3.004	5	0.43		18.7		OK
3.005	6	0.02		22.2		OK
3.006	7	0.30		13.0	SURCHARGED	
3.007	8	0.01		13.8		OK
3.008	9	0.01		13.2		OK
4.000	10	0.00		0.8		OK
3.009	11	0.01		10.4		OK
1.007	13	0.19		7.9	SURCHARGED	

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 1.000
 Region England and Wales Ratio R 0.326 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	SW50	30 Summer	2	+0%	30/360 Summer				106.334	-0.216	0.000
1.001	SW51	60 Summer	2	+0%	30/15 Summer				106.325	0.000	0.000
1.002	SW52	60 Summer	2	+0%	1/15 Summer				106.311	0.121	0.000
1.003	TANK	60 Summer	2	+0%	1/15 Summer				106.308	0.128	0.000
1.004	SW53	60 Summer	2	+0%	1/15 Summer				106.306	0.136	0.000
2.000	SW54	60 Summer	2	+0%	30/60 Summer				106.303	-0.092	0.000
1.005	SW55	60 Summer	2	+0%	1/15 Summer				106.303	0.178	0.000
1.006	12	240 Summer	2	+0%	30/60 Summer				105.702	-0.273	0.000
3.000	1	30 Summer	2	+0%	100/15 Summer				113.154	-0.491	0.000
3.001	2	30 Summer	2	+0%	1/30 Summer				113.154	0.079	0.000
3.002	3	15 Summer	2	+0%	100/15 Summer				112.841	-0.139	0.000
3.003	4	15 Summer	2	+0%	100/15 Summer				111.736	-0.139	0.000
3.004	5	15 Summer	2	+0%	30/15 Summer				111.628	-0.107	0.000
3.005	6	60 Summer	2	+0%	30/30 Summer				108.406	-0.629	0.000
3.006	7	60 Summer	2	+0%	1/15 Summer				108.404	0.414	0.000
3.007	8	240 Summer	2	+0%	30/120 Summer				105.703	-0.387	0.000
3.008	9	240 Summer	2	+0%	30/120 Summer				105.703	-0.337	0.000
4.000	10	240 Summer	2	+0%	30/120 Summer				105.703	-0.327	0.000
3.009	11	240 Summer	2	+0%	30/60 Summer				105.703	-0.292	0.000
1.007	13	240 Summer	2	+0%	1/15 Summer				105.702	0.887	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
				Flow (l/s)		Exceeded
1.000	SW50	0.09		8.8		OK
1.001	SW51	0.13		8.3		OK
1.002	SW52	0.45		14.2	SURCHARGED	
1.003	TANK	0.16		5.1	SURCHARGED	
1.004	SW53	0.14		8.0	SURCHARGED	
2.000	SW54	0.00		0.1		OK
1.005	SW55	0.05		5.0	SURCHARGED	
1.006	12	0.00		4.8		OK
3.000	1	0.02		6.7		OK
3.001	2	0.11		4.9	SURCHARGED	
3.002	3	0.30		13.8		OK
3.003	4	0.31		13.9		OK
3.004	5	0.53		23.4		OK
3.005	6	0.02		27.3		OK
3.006	7	0.30		13.0	SURCHARGED	
3.007	8	0.01		14.7		OK
3.008	9	0.01		13.9		OK
4.000	10	0.00		0.8		OK
3.009	11	0.01		10.4		OK
1.007	13	0.19		7.9	SURCHARGED	

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 1.000
 Region England and Wales Ratio R 0.326 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	SW50	360 Winter	30	+0%	30/360 Summer				106.582	0.032	0.000
1.001	SW51	360 Winter	30	+0%	30/15 Summer				106.582	0.257	0.000
1.002	SW52	360 Winter	30	+0%	1/15 Summer				106.582	0.392	0.000
1.003	TANK	360 Winter	30	+0%	1/15 Summer				106.581	0.401	0.000
1.004	SW53	360 Winter	30	+0%	1/15 Summer				106.583	0.413	0.000
2.000	SW54	360 Winter	30	+0%	30/60 Summer				106.583	0.188	0.000
1.005	SW55	360 Winter	30	+0%	1/15 Summer				106.583	0.458	0.000
1.006	12	480 Winter	30	+0%	30/60 Summer				106.833	0.858	0.000
3.000	1	60 Summer	30	+0%	100/15 Summer				113.504	-0.141	0.000
3.001	2	60 Summer	30	+0%	1/30 Summer				113.503	0.428	0.000
3.002	3	15 Summer	30	+0%	100/15 Summer				112.885	-0.095	0.000
3.003	4	15 Summer	30	+0%	100/15 Summer				111.830	-0.045	0.000
3.004	5	15 Summer	30	+0%	30/15 Summer				111.774	0.039	0.000
3.005	6	60 Winter	30	+0%	30/30 Summer				109.459	0.424	0.000
3.006	7	60 Winter	30	+0%	1/15 Summer				109.460	1.470	0.000
3.007	8	480 Winter	30	+0%	30/120 Summer				106.835	0.745	0.000
3.008	9	480 Winter	30	+0%	30/120 Summer				106.834	0.794	0.000
4.000	10	480 Winter	30	+0%	30/120 Summer				106.834	0.804	0.000
3.009	11	480 Winter	30	+0%	30/60 Summer				106.834	0.839	0.000
1.007	13	480 Winter	30	+0%	1/15 Summer				106.834	2.019	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
				Flow (l/s)		Exceeded
1.000	SW50	0.03		2.7	SURCHARGED	
1.001	SW51	0.07		4.5	SURCHARGED	
1.002	SW52	0.24		7.5	SURCHARGED	
1.003	TANK	0.17		5.6	SURCHARGED	
1.004	SW53	0.10		5.7	SURCHARGED	
2.000	SW54	0.00		0.1	SURCHARGED	
1.005	SW55	0.05		5.0	SURCHARGED	
1.006	12	0.00		5.3	SURCHARGED	
3.000	1	0.02		9.3	OK	
3.001	2	0.12		5.0	SURCHARGED	
3.002	3	0.63		28.8	OK	
3.003	4	0.62		28.2	OK	
3.004	5	1.16		51.0	SURCHARGED	
3.005	6	0.03		38.8	SURCHARGED	
3.006	7	0.31		13.3	SURCHARGED	
3.007	8	0.01		15.1	SURCHARGED	
3.008	9	0.01		15.8	SURCHARGED	
4.000	10	0.00		2.4	SURCHARGED	
3.009	11	0.01		13.9	SURCHARGED	
1.007	13	0.21		8.9	SURCHARGED	

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 1.000
 Region England and Wales Ratio R 0.326 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	SW50	960 Winter	100	+45%	30/360	Summer			107.409	0.859	0.000
1.001	SW51	960 Winter	100	+45%	30/15	Summer			107.408	1.083	0.000
1.002	SW52	960 Winter	100	+45%	1/15	Summer			107.407	1.217	0.000
1.003	TANK	960 Winter	100	+45%	1/15	Summer			107.406	1.226	0.000
1.004	SW53	960 Summer	100	+45%	1/15	Summer			107.414	1.244	0.000
2.000	SW54	960 Summer	100	+45%	30/60	Summer			107.418	1.023	0.000
1.005	SW55	960 Summer	100	+45%	1/15	Summer			107.426	1.301	0.000
1.006	12	480 Winter	100	+45%	30/60	Summer			107.677	1.702	0.000
3.000	1	120 Summer	100	+45%	100/15	Summer			114.807	1.162	0.000
3.001	2	120 Summer	100	+45%	1/30	Summer			114.807	1.732	0.000
3.002	3	15 Summer	100	+45%	100/15	Summer			112.997	0.017	0.000
3.003	4	15 Summer	100	+45%	100/15	Summer			112.282	0.407	0.000
3.004	5	15 Summer	100	+45%	30/15	Summer			112.117	0.382	0.000
3.005	6	120 Winter	100	+45%	30/30	Summer			111.314	2.279	0.000
3.006	7	120 Winter	100	+45%	1/15	Summer			111.313	3.323	0.000
3.007	8	480 Winter	100	+45%	30/120	Summer			107.679	1.589	0.000
3.008	9	480 Winter	100	+45%	30/120	Summer			107.678	1.638	0.000
4.000	10	480 Winter	100	+45%	30/120	Summer			107.678	1.648	0.000
3.009	11	480 Winter	100	+45%	30/60	Summer			107.678	1.683	0.000
1.007	13	480 Winter	100	+45%	1/15	Summer			107.677	2.862	0.000

The Alan Johnston Partnership		Page 19
1 Dale Street Liverpool L2 2ET	224-181 STAND GOLF CLUB SITE A SW NETWORK RESULTS	
Date 15/08/2025 16:10 File SW NETWORK.MDX	Designed by JJR Checked by JP	
XP Solutions	Network 2019.1	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
				Flow (l/s)		Exceeded
1.000	SW50	0.02		2.4	SURCHARGED	
1.001	SW51	0.06		3.9	SURCHARGED	
1.002	SW52	0.21		6.5	SURCHARGED	
1.003	TANK	0.18		5.6	SURCHARGED	
1.004	SW53	0.10		5.6	SURCHARGED	
2.000	SW54	0.00		0.1	SURCHARGED	
1.005	SW55	0.05		5.0	SURCHARGED	
1.006	12	0.00		5.6	SURCHARGED	
3.000	1	0.02		9.9	SURCHARGED	
3.001	2	0.13		5.8	SURCHARGED	
3.002	3	1.09		49.6	SURCHARGED	
3.003	4	1.09		49.5	SURCHARGED	
3.004	5	2.07		90.8	SURCHARGED	
3.005	6	0.03		49.3	SURCHARGED	
3.006	7	0.44		19.0	FLOOD RISK	
3.007	8	0.01		18.9	SURCHARGED	
3.008	9	0.02		23.2	SURCHARGED	
4.000	10	0.00		0.7	SURCHARGED	
3.009	11	0.02		27.8	SURCHARGED	
1.007	13	0.24		10.3	SURCHARGED	