

Project:

MIRA Technology Park – Plot 44

Client: Swanvale Developments

Prepared by:

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Report Reference: 10394-BCL-XX-XX-T-C-0001

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Design information for modelling purposes only and not to be used for construction setting out etc.

Summary of Strategy

In accordance with the SuDS hierarchy surface water will outfall via gravity to a piped network. Geotechnical investigations identified that drainage via modular soakaway create systems is not viable and there is no nearby watercourse outfall.

Surface Drainage

Flow rate used for design: 3.5l/s (to match greenfield runoff QBar rate)

Groundwater level: Not encountered during the intrusive investigation down to the base of the exploratory holes, the deepest of which was recorded at 3.55m below ground level (94.16mOD)

System type: Gravity system to meet requirements of BRegs Part H.

Software used (& FEH data Type): Causeway Flow with FEH22 data from UK Centre for Ecology & Hydrology (Flood Estimation Web Service <https://fehweb.ceh.ac.uk/>)

Storm event: 1 in 100 year +40% climate change in line with sitewide FRA.

Surface Water Drainage Calculations



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.008	5.00	98.060	450		436755.329	295166.427	1.490
S2	0.006	5.00	97.900	450		436734.400	295179.218	1.495
S3	0.141	5.00	97.550	600		436751.864	295144.335	1.435
S4	0.110	5.00	97.550	600		436748.791	295146.895	1.455
S5			97.550	600		436724.400	295167.213	1.615
S6			97.745	600		436718.773	295160.458	1.890
S7	0.265	5.00	97.780	600		436705.661	295144.705	2.030
S8	0.020	5.00	97.320	450	600	436717.455	295061.026	1.220
S9	0.047	5.00	97.390	450	600	436723.779	295076.260	1.185
S10			97.475	1200		436714.062	295075.904	2.365
S11	0.016	5.00	97.320	450	600	436682.803	295089.892	1.190
S12			97.485	1200		436687.549	295097.980	2.550
S13	0.006	5.00	97.390	450		436679.993	295105.280	1.110
S14	0.043	5.00	97.390	600	450	436693.729	295101.290	1.165
S15			97.485	600		436688.989	295103.084	2.580
S16	0.009	5.00	97.395	450		436724.515	295075.515	1.060
S17			97.505	450		436728.360	295072.313	1.350
S18	0.026	5.00	97.390	450	600	436737.409	295070.762	1.160
S19	0.028	5.00	97.620	450	600	436736.488	295082.064	1.225
S20			97.570	1200		436735.128	295080.437	2.460
S21	0.007	5.00	97.395	450		436693.172	295102.247	1.060
S22			97.570	1200		436696.752	295112.404	2.745
S23	0.009	5.00	97.370	450		436684.213	295111.803	1.060
S24	0.002	5.00	97.400	450		436685.850	295115.410	1.090
S25	0.031	5.00	97.620	450	600	436693.291	295118.044	1.240
S26			97.475	600		436688.838	295118.996	2.705
S27	0.015	5.00	97.445	1200		436686.872	295122.157	2.695
Ex SWMH			96.780	1200		436659.286	295133.681	2.900



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	24.528	0.600	96.570	96.405	0.165	148.7	150	5.50	50.0
1.001	S2	S5	15.625	0.600	96.405	96.085	0.320	48.8	150	5.68	50.0
2.000	S3	S4	4.000	0.600	96.115	96.095	0.020	200.0	300	5.06	50.0
2.001	S4	S5	31.745	0.600	96.095	95.935	0.160	198.4	300	5.54	50.0
1.002	S5	S6	8.791	0.600	95.935	95.855	0.080	109.9	300	5.78	50.0
1.003	S6	S7	20.497	0.600	95.855	95.750	0.105	195.2	300	6.08	50.0
1.004	S7	S27	29.350	0.600	95.750	94.750	1.000	29.4	300	6.25	50.0
3.000	S8	S10	15.261	0.600	96.100	95.260	0.840	18.2	150	5.11	50.0
4.000	S9	S10	9.724	0.600	96.205	95.260	0.945	10.3	150	5.05	50.0
3.001	S10	S12	34.500	0.600	95.110	94.935	0.175	197.1	300	5.62	50.0
5.000	S11	S12	9.378	0.600	96.130	95.085	1.045	9.0	150	5.05	50.0
3.002	S12	S15	5.304	0.600	94.935	94.905	0.030	176.8	300	5.70	50.0
6.000	S13	S15	9.260	0.600	96.280	95.055	1.225	7.6	150	5.04	50.0
7.000	S14	S15	5.068	0.600	96.225	95.055	1.170	4.3	150	5.02	50.0
3.003	S15	S22	12.130	0.600	94.905	94.825	0.080	151.6	300	5.86	50.0
8.000	S16	S17	5.004	0.600	96.335	96.155	0.180	27.8	150	5.04	50.0
8.001	S17	S20	10.574	0.600	96.155	95.260	0.895	11.8	150	5.10	50.0
9.000	S18	S20	9.940	0.600	96.230	95.160	1.070	9.3	150	5.05	50.0
10.000	S19	S20	2.121	0.600	96.395	95.160	1.235	1.7	150	5.00	50.0
8.002	S20	S22	49.946	0.600	95.110	94.860	0.250	199.8	300	5.85	50.0
11.000	S21	S22	10.769	0.600	96.335	94.875	1.460	7.4	150	5.05	50.0
3.004	S22	S26	10.300	0.600	94.825	94.770	0.055	187.3	300	6.01	50.0
12.000	S23	S26	8.552	0.600	96.310	94.820	1.490	5.7	150	5.03	50.0
13.000	S24	S26	4.668	0.600	96.310	94.820	1.490	3.1	150	5.01	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.822	14.5	1.1	1.340	1.345	0.008	0.0	28	0.483
1.001	1.443	25.5	1.9	1.345	1.315	0.014	0.0	28	0.851
2.000	1.108	78.3	19.1	1.135	1.155	0.141	0.0	100	0.919
2.001	1.112	78.6	34.0	1.155	1.315	0.251	0.0	138	1.074
1.002	1.499	106.0	35.9	1.315	1.590	0.265	0.0	120	1.357
1.003	1.122	79.3	35.9	1.590	1.730	0.265	0.0	142	1.095
1.004	2.912	205.9	71.8	1.730	2.395	0.530	0.0	122	2.662
3.000	2.374	42.0	2.7	1.070	2.065	0.020	0.0	26	1.349
4.000	3.159	55.8	6.4	1.035	2.065	0.047	0.0	34	2.114
3.001	1.116	78.9	9.1	2.065	2.250	0.067	0.0	68	0.749
5.000	3.383	59.8	2.2	1.040	2.250	0.016	0.0	20	1.612
3.002	1.179	83.3	11.2	2.250	2.280	0.083	0.0	74	0.830
6.000	3.688	65.2	0.8	0.960	2.280	0.006	0.0	12	1.276
7.000	4.876	86.2	5.8	1.015	2.280	0.043	0.0	26	2.775
3.003	1.274	90.1	17.9	2.280	2.445	0.132	0.0	91	1.001
8.000	1.917	33.9	1.2	0.910	1.200	0.009	0.0	20	0.911
8.001	2.947	52.1	1.2	1.200	2.160	0.009	0.0	16	1.236
9.000	3.325	58.8	3.5	1.010	2.260	0.026	0.0	25	1.839
10.000	7.751	137.0	3.8	1.075	2.260	0.028	0.0	17	3.414
8.002	1.108	78.4	8.5	2.160	2.410	0.063	0.0	67	0.733
11.000	3.733	66.0	0.9	0.910	2.545	0.007	0.0	13	1.333
3.004	1.145	81.0	27.4	2.445	2.405	0.202	0.0	120	1.037
12.000	4.234	74.8	1.2	0.910	2.505	0.009	0.0	13	1.560
13.000	5.735	101.4	0.3	0.940	2.505	0.002	0.0	6	1.168



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
14.000	S25	S26	4.554	0.600	96.380	94.820	1.560	2.9	150	5.01	50.0
3.005	S26	S27	3.722	0.600	94.770	94.750	0.020	186.1	300	6.06	50.0
1.005	S27	Ex SWMH	29.897	0.600	94.750	93.880	0.870	34.4	300	6.43	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
14.000	5.942	105.0	4.2	1.090	2.505	0.031	0.0	20	2.890
3.005	1.149	81.2	33.1	2.405	2.395	0.244	0.0	133	1.092
1.005	2.691	190.2	106.9	2.395	2.600	0.789	0.0	161	2.765

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	24.528	148.7	150	Circular	98.060	96.570	1.340	97.900	96.405	1.345
1.001	15.625	48.8	150	Circular	97.900	96.405	1.345	97.550	96.085	1.315
2.000	4.000	200.0	300	Circular	97.550	96.115	1.135	97.550	96.095	1.155
2.001	31.745	198.4	300	Circular	97.550	96.095	1.155	97.550	95.935	1.315
1.002	8.791	109.9	300	Circular	97.550	95.935	1.315	97.745	95.855	1.590
1.003	20.497	195.2	300	Circular	97.745	95.855	1.590	97.780	95.750	1.730
1.004	29.350	29.4	300	Circular	97.780	95.750	1.730	97.445	94.750	2.395
3.000	15.261	18.2	150	Circular	97.320	96.100	1.070	97.475	95.260	2.065
4.000	9.724	10.3	150	Circular	97.390	96.205	1.035	97.475	95.260	2.065
3.001	34.500	197.1	300	Circular	97.475	95.110	2.065	97.485	94.935	2.250
5.000	9.378	9.0	150	Circular	97.320	96.130	1.040	97.485	95.085	2.250
3.002	5.304	176.8	300	Circular	97.485	94.935	2.250	97.485	94.905	2.280
6.000	9.260	7.6	150	Circular	97.390	96.280	0.960	97.485	95.055	2.280
7.000	5.068	4.3	150	Circular	97.390	96.225	1.015	97.485	95.055	2.280
3.003	12.130	151.6	300	Circular	97.485	94.905	2.280	97.570	94.825	2.445
8.000	5.004	27.8	150	Circular	97.395	96.335	0.910	97.505	96.155	1.200
8.001	10.574	11.8	150	Circular	97.505	96.155	1.200	97.570	95.260	2.160

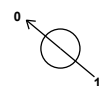
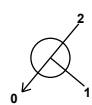
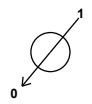
Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	450		Manhole	Adoptable	S2	450	Manhole	Adoptable
1.001	S2	450		Manhole	Adoptable	S5	600	Manhole	Adoptable
2.000	S3	600		Manhole	Adoptable	S4	600	Manhole	Adoptable
2.001	S4	600		Manhole	Adoptable	S5	600	Manhole	Adoptable
1.002	S5	600		Manhole	Adoptable	S6	600	Manhole	Adoptable
1.003	S6	600		Manhole	Adoptable	S7	600	Manhole	Adoptable
1.004	S7	600		Manhole	Adoptable	S27	1200	Manhole	Adoptable
3.000	S8	450	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable
4.000	S9	450	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable
3.001	S10	1200		Manhole	Adoptable	S12	1200	Manhole	Adoptable
5.000	S11	450	600	Manhole	Adoptable	S12	1200	Manhole	Adoptable
3.002	S12	1200		Manhole	Adoptable	S15	600	Manhole	Adoptable
6.000	S13	450		Manhole	Adoptable	S15	600	Manhole	Adoptable
7.000	S14	600	450	Manhole	Adoptable	S15	600	Manhole	Adoptable
3.003	S15	600		Manhole	Adoptable	S22	1200	Manhole	Adoptable
8.000	S16	450		Manhole	Adoptable	S17	450	Manhole	Adoptable
8.001	S17	450		Manhole	Adoptable	S20	1200	Manhole	Adoptable

Pipeline Schedule

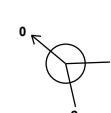
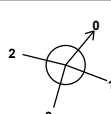
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
9.000	9.940	9.3	150	Circular	97.390	96.230	1.010	97.570	95.160	2.260
10.000	2.121	1.7	150	Circular	97.620	96.395	1.075	97.570	95.160	2.260
8.002	49.946	199.8	300	Circular	97.570	95.110	2.160	97.570	94.860	2.410
11.000	10.769	7.4	150	Circular	97.395	96.335	0.910	97.570	94.875	2.545
3.004	10.300	187.3	300	Circular	97.570	94.825	2.445	97.475	94.770	2.405
12.000	8.552	5.7	150	Circular	97.370	96.310	0.910	97.475	94.820	2.505
13.000	4.668	3.1	150	Circular	97.400	96.310	0.940	97.475	94.820	2.505
14.000	4.554	2.9	150	Circular	97.620	96.380	1.090	97.475	94.820	2.505
3.005	3.722	186.1	300	Circular	97.475	94.770	2.405	97.445	94.750	2.395
1.005	29.897	34.4	300	Circular	97.445	94.750	2.395	96.780	93.880	2.600

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
9.000	S18	450	600	Manhole	Adoptable	S20	1200	Manhole	Adoptable
10.000	S19	450	600	Manhole	Adoptable	S20	1200	Manhole	Adoptable
8.002	S20	1200		Manhole	Adoptable	S22	1200	Manhole	Adoptable
11.000	S21	450		Manhole	Adoptable	S22	1200	Manhole	Adoptable
3.004	S22	1200		Manhole	Adoptable	S26	600	Manhole	Adoptable
12.000	S23	450		Manhole	Adoptable	S26	600	Manhole	Adoptable
13.000	S24	450		Manhole	Adoptable	S26	600	Manhole	Adoptable
14.000	S25	450	600	Manhole	Adoptable	S26	600	Manhole	Adoptable
3.005	S26	600		Manhole	Adoptable	S27	1200	Manhole	Adoptable
1.005	S27	1200		Manhole	Adoptable	Ex SWMH	1200	Manhole	Adoptable

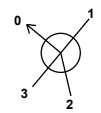
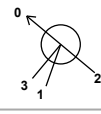
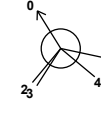
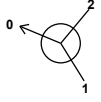
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	436755.329	295166.427	98.060	1.490	450						
							0	1.000	96.570	150	
S2	436734.400	295179.218	97.900	1.495	450			1	1.000	96.405	150
							0	1.001	96.405	150	
S3	436751.864	295144.335	97.550	1.435	600						
							0	2.000	96.115	300	
S4	436748.791	295146.895	97.550	1.455	600			1	2.000	96.095	300
							0	2.001	96.095	300	
S5	436724.400	295167.213	97.550	1.615	600			1	2.001	95.935	300
							2	1.001	96.085	150	
							0	1.002	95.935	300	
S6	436718.773	295160.458	97.745	1.890	600			1	1.002	95.855	300
							0	1.003	95.855	300	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
S7	436705.661	295144.705	97.780	2.030	600			1	1.003	95.750	300
								0	1.004	95.750	300
S8	436717.455	295061.026	97.320	1.220	450	600					
								0	3.000	96.100	150
S9	436723.779	295076.260	97.390	1.185	450	600					
								0	4.000	96.205	150
S10	436714.062	295075.904	97.475	2.365	1200			1	4.000	95.260	150
								2	3.000	95.260	150
								0	3.001	95.110	300
S11	436682.803	295089.892	97.320	1.190	450	600					
								0	5.000	96.130	150
S12	436687.549	295097.980	97.485	2.550	1200			1	5.000	95.085	150
								2	3.001	94.935	300
								0	3.002	94.935	300
S13	436679.993	295105.280	97.390	1.110	450						
								0	6.000	96.280	150
S14	436693.729	295101.290	97.390	1.165	600	450					
								0	7.000	96.225	150
S15	436688.989	295103.084	97.485	2.580	600			1	7.000	95.055	150
								2	6.000	95.055	150
								3	3.002	94.905	300
								0	3.003	94.905	300
S16	436724.515	295075.515	97.395	1.060	450						
								0	8.000	96.335	150
S17	436728.360	295072.313	97.505	1.350	450			1	8.000	96.155	150
								0	8.001	96.155	150
S18	436737.409	295070.762	97.390	1.160	450	600					
								0	9.000	96.230	150
S19	436736.488	295082.064	97.620	1.225	450	600					
								0	10.000	96.395	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
S20	436735.128	295080.437	97.570	2.460	1200			1 2 3 0	10.000 9.000 8.001 8.002	95.160 95.160 95.260 95.110	150 150 150 300
S21	436693.172	295102.247	97.395	1.060	450			0	11.000	96.335	150
S22	436696.752	295112.404	97.570	2.745	1200			1 2 3 0	11.000 8.002 3.003 3.004	94.875 94.860 94.825 94.825	150 300 300 300
S23	436684.213	295111.803	97.370	1.060	450			0	12.000	96.310	150
S24	436685.850	295115.410	97.400	1.090	450			0	13.000	96.310	150
S25	436693.291	295118.044	97.620	1.240	450	600		0	14.000	96.380	150
S26	436688.838	295118.996	97.475	2.705	600			1 2 3 4 0	14.000 13.000 12.000 3.004 3.005	94.820 94.820 94.820 94.770 94.770	150 150 150 300 300
S27	436686.872	295122.157	97.445	2.695	1200			1 2 0	3.005 1.004 1.005	94.750 94.750 94.750	300 300 300
Ex SWMH	436659.286	295133.681	96.780	2.900	1200			1	1.005	93.880	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	2160	Check Discharge Volume	x

Storm Durations

60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0
100	40	0	0

Node S27 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	94.750	Product Number	CTL-SHE-0072-3500-2470-3500
Design Depth (m)	2.470	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node S8 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.220	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.100	Diameter (m)	0.014		

Node S9 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.185	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.1		
Invert Level (m)	96.205	Diameter (m)	0.022		

Node S11 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.190	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.130	Diameter (m)	0.014		

Node S14 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.165	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	96.225	Diameter (m)	0.021		

Node S18 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.160	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.6		
Invert Level (m)	96.230	Diameter (m)	0.016		

Node S19 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.225	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.395	Diameter (m)	0.014		

Node S25 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.240	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.380	Diameter (m)	0.014		

Node S20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	95.110
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	2100

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	299.0	0.0	1.125	299.0	0.0	1.126	0.0	0.0

Node S10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	95.110
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	2115

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	112.0	0.0	1.125	112.0	0.0	1.126	0.0	0.0

Node S8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.000	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	300	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	25.350		

Node S9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	294	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.050		

Node S11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.000	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	248	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.100		

Node S13 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	60	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	7.600		

Node S14 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	300	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	17.555		

Node S16 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.075	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	60	Depth (m)	
Safety Factor	2.0	Width (m)	2.550	Inf Depth (m)	
Porosity	0.30	Length (m)	7.600		

Node S18 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	320	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	22.450		

Node S19 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.300	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	484	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	28.760		

Node S21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.075	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	60	Depth (m)	
Safety Factor	2.0	Width (m)	2.550	Inf Depth (m)	
Porosity	0.30	Length (m)	3.100		

Node S23 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.050	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	60	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	5.100		

Node S24 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.080	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	60	Depth (m)	
Safety Factor	2.0	Width (m)	2.550	Inf Depth (m)	
Porosity	0.30	Length (m)	3.100		

Node S25 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.300	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	544	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	31.200		

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	356.0	0.0	0.100	356.0	0.0	0.101	0.0	0.0

Node S4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	



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	52.0	0.0	0.100	52.0	0.0	0.101	0.0	0.0

Node S5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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	260.0	0.0	0.100	260.0	0.0	0.101	0.0	0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.17%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	96.605	0.035	1.7	0.0056	0.0000	OK
60 minute summer	S2	33	96.440	0.035	3.0	0.0055	0.0000	OK
60 minute summer	S3	33	96.300	0.185	29.7	0.0525	0.0000	OK
60 minute summer	S4	33	96.286	0.191	52.9	0.0541	0.0000	OK
60 minute summer	S5	34	96.142	0.207	55.9	0.0585	0.0000	OK
60 minute summer	S6	34	96.115	0.260	55.4	0.0736	0.0000	OK
60 minute summer	S7	34	96.067	0.317	109.6	0.0898	0.0000	SURCHARGED
120 minute winter	S8	98	97.084	0.984	2.2	3.4060	0.0000	FLOOD RISK
120 minute winter	S9	98	97.205	1.000	5.1	8.2850	0.0000	FLOOD RISK
600 minute winter	S10	600	95.777	0.667	5.6	71.7405	0.0000	SURCHARGED
120 minute winter	S11	96	97.069	0.939	1.7	2.3092	0.0000	FLOOD RISK
600 minute winter	S12	615	95.779	0.844	4.3	0.9548	0.0000	SURCHARGED
60 minute summer	S13	33	96.295	0.015	1.3	0.0023	0.0000	OK
120 minute winter	S14	98	97.211	0.986	4.7	7.6533	0.0000	FLOOD RISK
600 minute winter	S15	585	95.776	0.871	4.0	0.2465	0.0000	SURCHARGED
60 minute summer	S16	33	96.361	0.026	1.9	0.0041	0.0000	OK
60 minute summer	S17	33	96.175	0.020	1.9	0.0032	0.0000	OK
120 minute winter	S18	100	97.211	0.981	2.8	4.5931	0.0000	FLOOD RISK
180 minute winter	S19	148	97.427	1.032	2.3	5.6933	0.0000	FLOOD RISK
600 minute winter	S20	600	95.776	0.666	14.6	190.0631	0.0000	SURCHARGED
60 minute summer	S21	33	96.351	0.016	1.5	0.0025	0.0000	OK
600 minute winter	S22	600	95.776	0.951	16.3	1.0761	0.0000	SURCHARGED
60 minute summer	S23	33	96.327	0.017	1.9	0.0026	0.0000	OK
60 minute summer	S24	32	96.317	0.007	0.4	0.0011	0.0000	OK
120 minute winter	S25	118	97.439	1.059	3.4	6.5305	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S1	1.000	S2	1.7	0.548	0.117	0.0759	
60 minute summer	S2	1.001	S5	3.0	0.913	0.117	0.0713	
60 minute summer	S3	2.000	S4	29.7	0.640	0.379	0.1861	
60 minute summer	S4	2.001	S5	52.9	1.115	0.673	1.5472	
60 minute summer	S5	1.002	S6	55.4	1.113	0.523	0.5129	
60 minute summer	S6	1.003	S7	54.3	1.174	0.685	1.3865	
60 minute summer	S7	1.004	S27	104.2	1.516	0.506	2.0668	
120 minute winter	S8	Orifice	S10	0.4				
120 minute winter	S9	Orifice	S10	1.0				
600 minute winter	S10	3.001	S12	-4.3	0.210	-0.054	2.4295	
120 minute winter	S11	Orifice	S12	0.4				
600 minute winter	S12	3.002	S15	-4.0	0.210	-0.048	0.3735	
60 minute summer	S13	6.000	S15	1.3	0.779	0.020	0.0856	
120 minute winter	S14	Orifice	S15	0.9				
600 minute winter	S15	3.003	S22	-3.0	0.259	-0.033	0.8542	
60 minute summer	S16	8.000	S17	1.9	1.114	0.056	0.0086	
60 minute summer	S17	8.001	S20	1.9	1.385	0.036	0.0940	
120 minute winter	S18	Orifice	S20	0.5				
180 minute winter	S19	Orifice	S20	0.4				
600 minute winter	S20	8.002	S22	-13.4	0.286	-0.171	3.5172	
60 minute summer	S21	11.000	S22	1.5	0.682	0.023	0.1000	
600 minute winter	S22	3.004	S26	-16.1	-0.229	-0.199	0.7253	
60 minute summer	S23	12.000	S26	1.9	0.872	0.025	0.0798	
60 minute summer	S24	13.000	S26	0.4	0.038	0.004	0.0418	
120 minute winter	S25	Orifice	S26	0.4				

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.17%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	S26	600	95.776	1.006	16.2	0.2847	0.0000	SURCHARGED
600 minute winter	S27	600	95.777	1.027	17.5	1.1620	0.0000	SURCHARGED
60 minute summer	Ex SWMH	1	93.880	0.000	2.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	S26	3.005	S27	-15.4	-0.219	-0.189	0.2621	
600 minute winter	S27	Hydro-Brake®	Ex SWMH	2.4				356.8

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.17%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	97.399	0.829	12.3	0.1318	0.0000	SURCHARGED
60 minute summer	S2	33	97.375	0.970	12.7	0.1542	0.0000	SURCHARGED
60 minute summer	S3	36	97.468	1.353	53.2	6.8487	0.0000	FLOOD RISK
60 minute summer	S4	35	97.458	1.363	88.6	0.8312	0.0000	FLOOD RISK
60 minute summer	S5	33	97.344	1.409	92.5	0.3988	0.0000	FLOOD RISK
60 minute summer	S6	33	97.291	1.436	93.2	0.4064	0.0000	SURCHARGED
720 minute winter	S7	705	97.212	1.462	25.6	0.4139	0.0000	SURCHARGED
120 minute winter	S8	118	97.199	1.099	3.8	7.8224	0.0000	FLOOD RISK
120 minute winter	S9	118	97.373	1.168	8.9	18.4535	0.0000	FLOOD RISK
720 minute winter	S10	705	97.210	2.100	8.0	122.1287	0.0000	FLOOD RISK
180 minute winter	S11	148	97.182	1.052	2.3	5.7228	0.0000	FLOOD RISK
720 minute winter	S12	705	97.213	2.278	6.7	2.5759	0.0000	FLOOD RISK
720 minute winter	S13	705	97.213	0.933	1.1	1.7694	0.0000	FLOOD RISK
120 minute winter	S14	118	97.389	1.164	8.2	17.0500	0.0000	FLOOD RISK
720 minute winter	S15	705	97.212	2.307	6.4	0.6528	0.0000	FLOOD RISK
720 minute winter	S16	705	97.213	0.878	0.5	0.9398	0.0000	FLOOD RISK
720 minute winter	S17	705	97.213	1.058	0.7	0.1682	0.0000	FLOOD RISK
180 minute winter	S18	172	97.387	1.157	3.7	10.3798	0.0000	FLOOD RISK
240 minute winter	S19	232	97.584	1.189	3.2	12.5241	0.0000	FLOOD RISK
720 minute winter	S20	705	97.212	2.102	21.0	322.0755	0.0000	SURCHARGED
720 minute winter	S21	705	97.213	0.878	0.4	0.2206	0.0000	FLOOD RISK
720 minute winter	S22	705	97.211	2.386	24.9	2.6990	0.0000	SURCHARGED
720 minute winter	S23	705	97.213	0.903	1.0	1.3843	0.0000	FLOOD RISK
720 minute winter	S24	705	97.212	0.902	0.8	0.2180	0.0000	FLOOD RISK
180 minute winter	S25	176	97.605	1.225	4.4	14.2658	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S1	1.000	S2	-9.5	0.581	-0.651	0.4318	
60 minute summer	S2	1.001	S5	15.7	0.899	0.617	0.2751	
60 minute summer	S3	2.000	S4	70.1	0.996	0.896	0.2817	
60 minute summer	S4	2.001	S5	88.9	1.262	1.130	2.2355	
60 minute summer	S5	1.002	S6	93.2	1.323	0.879	0.6191	
60 minute summer	S6	1.003	S7	94.0	1.335	1.185	1.4434	
720 minute winter	S7	1.004	S27	25.6	0.512	0.124	2.0668	
120 minute winter	S8	Orifice	S10	0.4				
120 minute winter	S9	Orifice	S10	1.1				
720 minute winter	S10	3.001	S12	-6.6	-0.094	-0.084	2.4295	
180 minute winter	S11	Orifice	S12	0.4				
720 minute winter	S12	3.002	S15	-6.3	0.124	-0.076	0.3735	
720 minute winter	S13	6.000	S15	-1.0	0.070	-0.016	0.1630	
120 minute winter	S14	Orifice	S15	1.0				
720 minute winter	S15	3.003	S22	-5.2	0.172	-0.058	0.8542	
720 minute winter	S16	8.000	S17	0.6	0.712	0.018	0.0881	
720 minute winter	S17	8.001	S20	-0.7	0.705	-0.014	0.1862	
180 minute winter	S18	Orifice	S20	0.6				
240 minute winter	S19	Orifice	S20	0.4				
720 minute winter	S20	8.002	S22	-19.6	-0.279	-0.251	3.5172	
720 minute winter	S21	11.000	S22	-0.3	0.029	-0.005	0.1896	
720 minute winter	S22	3.004	S26	-24.6	-0.349	-0.304	0.7253	
720 minute winter	S23	12.000	S26	-0.9	-0.051	-0.012	0.1506	
720 minute winter	S24	13.000	S26	-0.8	-0.045	-0.008	0.0822	
180 minute winter	S25	Orifice	S26	0.5				

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.17%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	S26	705	97.213	2.443	24.7	0.6914	0.0000	FLOOD RISK
720 minute winter	S27	690	97.211	2.461	26.3	2.7838	0.0000	FLOOD RISK
60 minute summer	Ex SWMH	1	93.880	0.000	2.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	S26	3.005	S27	-23.8	-0.338	-0.293	0.2621	
720 minute winter	S27	Hydro-Brake®	Ex SWMH	3.5				443.1

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.008	5.00	98.060	450		436755.329	295166.427	1.490
S2	0.006	5.00	97.900	450		436734.400	295179.218	1.495
S3	0.141	5.00	97.550	600		436751.864	295144.335	1.435
S4	0.110	5.00	97.550	600		436748.791	295146.895	1.455
S5			97.550	600		436724.400	295167.213	1.615
S6			97.745	600		436718.773	295160.458	1.890
S7	0.265	5.00	97.780	600		436705.661	295144.705	2.030
S8	0.020	5.00	97.320	450	600	436717.455	295061.026	1.220
S9	0.047	5.00	97.390	450	600	436723.779	295076.260	1.185
S10			97.475	1200		436714.062	295075.904	2.365
S11	0.016	5.00	97.320	450	600	436682.803	295089.892	1.190
S12			97.485	1200		436687.549	295097.980	2.550
S13	0.006	5.00	97.390	450		436679.993	295105.280	1.110
S14	0.043	5.00	97.390	600	450	436693.729	295101.290	1.165
S15			97.485	600		436688.989	295103.084	2.580
S16	0.009	5.00	97.395	450		436724.515	295075.515	1.060
S17			97.505	450		436728.360	295072.313	1.350
S18	0.026	5.00	97.390	450	600	436737.409	295070.762	1.160
S19	0.028	5.00	97.620	450	600	436736.488	295082.064	1.225
S20			97.570	1200		436735.128	295080.437	2.460
S21	0.007	5.00	97.395	450		436693.172	295102.247	1.060
S22			97.570	1200		436696.752	295112.404	2.745
S23	0.009	5.00	97.370	450		436684.213	295111.803	1.060
S24	0.002	5.00	97.400	450		436685.850	295115.410	1.090
S25	0.031	5.00	97.620	450	600	436693.291	295118.044	1.240
S26			97.475	600		436688.838	295118.996	2.705
S27	0.015	5.00	97.445	1200		436686.872	295122.157	2.695
Ex SWMH			96.780	1200		436659.286	295133.681	2.900

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	24.528	0.600	96.570	96.405	0.165	148.7	150	5.50	50.0
1.001	S2	S5	15.625	0.600	96.405	96.085	0.320	48.8	150	5.68	50.0
2.000	S3	S4	4.000	0.600	96.115	96.095	0.020	200.0	300	5.06	50.0
2.001	S4	S5	31.745	0.600	96.095	95.935	0.160	198.4	300	5.54	50.0
1.002	S5	S6	8.791	0.600	95.935	95.855	0.080	109.9	300	5.78	50.0
1.003	S6	S7	20.497	0.600	95.855	95.750	0.105	195.2	300	6.08	50.0
1.004	S7	S27	29.350	0.600	95.750	94.750	1.000	29.4	300	6.25	50.0
3.000	S8	S10	15.261	0.600	96.100	95.260	0.840	18.2	150	5.11	50.0
4.000	S9	S10	9.724	0.600	96.205	95.260	0.945	10.3	150	5.05	50.0
3.001	S10	S12	34.500	0.600	95.110	94.935	0.175	197.1	300	5.62	50.0
5.000	S11	S12	9.378	0.600	96.130	95.085	1.045	9.0	150	5.05	50.0
3.002	S12	S15	5.304	0.600	94.935	94.905	0.030	176.8	300	5.70	50.0
6.000	S13	S15	9.260	0.600	96.280	95.055	1.225	7.6	150	5.04	50.0
7.000	S14	S15	5.068	0.600	96.225	95.055	1.170	4.3	150	5.02	50.0
3.003	S15	S22	12.130	0.600	94.905	94.825	0.080	151.6	300	5.86	50.0
8.000	S16	S17	5.004	0.600	96.335	96.155	0.180	27.8	150	5.04	50.0
8.001	S17	S20	10.574	0.600	96.155	95.260	0.895	11.8	150	5.10	50.0
9.000	S18	S20	9.940	0.600	96.230	95.160	1.070	9.3	150	5.05	50.0
10.000	S19	S20	2.121	0.600	96.395	95.160	1.235	1.7	150	5.00	50.0
8.002	S20	S22	49.946	0.600	95.110	94.860	0.250	199.8	300	5.85	50.0
11.000	S21	S22	10.769	0.600	96.335	94.875	1.460	7.4	150	5.05	50.0
3.004	S22	S26	10.300	0.600	94.825	94.770	0.055	187.3	300	6.01	50.0
12.000	S23	S26	8.552	0.600	96.310	94.820	1.490	5.7	150	5.03	50.0
13.000	S24	S26	4.668	0.600	96.310	94.820	1.490	3.1	150	5.01	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.822	14.5	1.1	1.340	1.345	0.008	0.0	28	0.483
1.001	1.443	25.5	1.9	1.345	1.315	0.014	0.0	28	0.851
2.000	1.108	78.3	19.1	1.135	1.155	0.141	0.0	100	0.919
2.001	1.112	78.6	34.0	1.155	1.315	0.251	0.0	138	1.074
1.002	1.499	106.0	35.9	1.315	1.590	0.265	0.0	120	1.357
1.003	1.122	79.3	35.9	1.590	1.730	0.265	0.0	142	1.095
1.004	2.912	205.9	71.8	1.730	2.395	0.530	0.0	122	2.662
3.000	2.374	42.0	2.7	1.070	2.065	0.020	0.0	26	1.349
4.000	3.159	55.8	6.4	1.035	2.065	0.047	0.0	34	2.114
3.001	1.116	78.9	9.1	2.065	2.250	0.067	0.0	68	0.749
5.000	3.383	59.8	2.2	1.040	2.250	0.016	0.0	20	1.612
3.002	1.179	83.3	11.2	2.250	2.280	0.083	0.0	74	0.830
6.000	3.688	65.2	0.8	0.960	2.280	0.006	0.0	12	1.276
7.000	4.876	86.2	5.8	1.015	2.280	0.043	0.0	26	2.775
3.003	1.274	90.1	17.9	2.280	2.445	0.132	0.0	91	1.001
8.000	1.917	33.9	1.2	0.910	1.200	0.009	0.0	20	0.911
8.001	2.947	52.1	1.2	1.200	2.160	0.009	0.0	16	1.236
9.000	3.325	58.8	3.5	1.010	2.260	0.026	0.0	25	1.839
10.000	7.751	137.0	3.8	1.075	2.260	0.028	0.0	17	3.414
8.002	1.108	78.4	8.5	2.160	2.410	0.063	0.0	67	0.733
11.000	3.733	66.0	0.9	0.910	2.545	0.007	0.0	13	1.333
3.004	1.145	81.0	27.4	2.445	2.405	0.202	0.0	120	1.037
12.000	4.234	74.8	1.2	0.910	2.505	0.009	0.0	13	1.560
13.000	5.735	101.4	0.3	0.940	2.505	0.002	0.0	6	1.168

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
14.000	S25	S26	4.554	0.600	96.380	94.820	1.560	2.9	150	5.01	50.0
3.005	S26	S27	3.722	0.600	94.770	94.750	0.020	186.1	300	6.06	50.0
1.005	S27	Ex SWMH	29.897	0.600	94.750	93.880	0.870	34.4	300	6.43	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
14.000	5.942	105.0	4.2	1.090	2.505	0.031	0.0	20	2.890
3.005	1.149	81.2	33.1	2.405	2.395	0.244	0.0	133	1.092
1.005	2.691	190.2	106.9	2.395	2.600	0.789	0.0	161	2.765

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	24.528	148.7	150	Circular	98.060	96.570	1.340	97.900	96.405	1.345
1.001	15.625	48.8	150	Circular	97.900	96.405	1.345	97.550	96.085	1.315
2.000	4.000	200.0	300	Circular	97.550	96.115	1.135	97.550	96.095	1.155
2.001	31.745	198.4	300	Circular	97.550	96.095	1.155	97.550	95.935	1.315
1.002	8.791	109.9	300	Circular	97.550	95.935	1.315	97.745	95.855	1.590
1.003	20.497	195.2	300	Circular	97.745	95.855	1.590	97.780	95.750	1.730
1.004	29.350	29.4	300	Circular	97.780	95.750	1.730	97.445	94.750	2.395
3.000	15.261	18.2	150	Circular	97.320	96.100	1.070	97.475	95.260	2.065
4.000	9.724	10.3	150	Circular	97.390	96.205	1.035	97.475	95.260	2.065
3.001	34.500	197.1	300	Circular	97.475	95.110	2.065	97.485	94.935	2.250
5.000	9.378	9.0	150	Circular	97.320	96.130	1.040	97.485	95.085	2.250
3.002	5.304	176.8	300	Circular	97.485	94.935	2.250	97.485	94.905	2.280
6.000	9.260	7.6	150	Circular	97.390	96.280	0.960	97.485	95.055	2.280
7.000	5.068	4.3	150	Circular	97.390	96.225	1.015	97.485	95.055	2.280
3.003	12.130	151.6	300	Circular	97.485	94.905	2.280	97.570	94.825	2.445
8.000	5.004	27.8	150	Circular	97.395	96.335	0.910	97.505	96.155	1.200
8.001	10.574	11.8	150	Circular	97.505	96.155	1.200	97.570	95.260	2.160

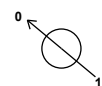
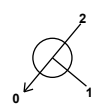
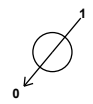
Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	450		Manhole	Adoptable	S2	450	Manhole	Adoptable
1.001	S2	450		Manhole	Adoptable	S5	600	Manhole	Adoptable
2.000	S3	600		Manhole	Adoptable	S4	600	Manhole	Adoptable
2.001	S4	600		Manhole	Adoptable	S5	600	Manhole	Adoptable
1.002	S5	600		Manhole	Adoptable	S6	600	Manhole	Adoptable
1.003	S6	600		Manhole	Adoptable	S7	600	Manhole	Adoptable
1.004	S7	600		Manhole	Adoptable	S27	1200	Manhole	Adoptable
3.000	S8	450	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable
4.000	S9	450	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable
3.001	S10	1200		Manhole	Adoptable	S12	1200	Manhole	Adoptable
5.000	S11	450	600	Manhole	Adoptable	S12	1200	Manhole	Adoptable
3.002	S12	1200		Manhole	Adoptable	S15	600	Manhole	Adoptable
6.000	S13	450		Manhole	Adoptable	S15	600	Manhole	Adoptable
7.000	S14	600	450	Manhole	Adoptable	S15	600	Manhole	Adoptable
3.003	S15	600		Manhole	Adoptable	S22	1200	Manhole	Adoptable
8.000	S16	450		Manhole	Adoptable	S17	450	Manhole	Adoptable
8.001	S17	450		Manhole	Adoptable	S20	1200	Manhole	Adoptable

Pipeline Schedule

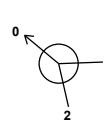
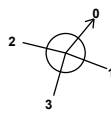
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
9.000	9.940	9.3	150	Circular	97.390	96.230	1.010	97.570	95.160	2.260
10.000	2.121	1.7	150	Circular	97.620	96.395	1.075	97.570	95.160	2.260
8.002	49.946	199.8	300	Circular	97.570	95.110	2.160	97.570	94.860	2.410
11.000	10.769	7.4	150	Circular	97.395	96.335	0.910	97.570	94.875	2.545
3.004	10.300	187.3	300	Circular	97.570	94.825	2.445	97.475	94.770	2.405
12.000	8.552	5.7	150	Circular	97.370	96.310	0.910	97.475	94.820	2.505
13.000	4.668	3.1	150	Circular	97.400	96.310	0.940	97.475	94.820	2.505
14.000	4.554	2.9	150	Circular	97.620	96.380	1.090	97.475	94.820	2.505
3.005	3.722	186.1	300	Circular	97.475	94.770	2.405	97.445	94.750	2.395
1.005	29.897	34.4	300	Circular	97.445	94.750	2.395	96.780	93.880	2.600

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
9.000	S18	450	600	Manhole	Adoptable	S20	1200	Manhole	Adoptable
10.000	S19	450	600	Manhole	Adoptable	S20	1200	Manhole	Adoptable
8.002	S20	1200		Manhole	Adoptable	S22	1200	Manhole	Adoptable
11.000	S21	450		Manhole	Adoptable	S22	1200	Manhole	Adoptable
3.004	S22	1200		Manhole	Adoptable	S26	600	Manhole	Adoptable
12.000	S23	450		Manhole	Adoptable	S26	600	Manhole	Adoptable
13.000	S24	450		Manhole	Adoptable	S26	600	Manhole	Adoptable
14.000	S25	450	600	Manhole	Adoptable	S26	600	Manhole	Adoptable
3.005	S26	600		Manhole	Adoptable	S27	1200	Manhole	Adoptable
1.005	S27	1200		Manhole	Adoptable	Ex SWMH	1200	Manhole	Adoptable

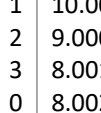
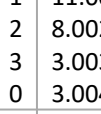
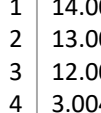
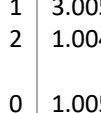
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	436755.329	295166.427	98.060	1.490	450						
							0	1.000	96.570	150	
S2	436734.400	295179.218	97.900	1.495	450			1	1.000	96.405	150
							0	1.001	96.405	150	
S3	436751.864	295144.335	97.550	1.435	600						
							0	2.000	96.115	300	
S4	436748.791	295146.895	97.550	1.455	600			1	2.000	96.095	300
							0	2.001	96.095	300	
S5	436724.400	295167.213	97.550	1.615	600			1	2.001	95.935	300
							2	1.001	96.085	150	
							0	1.002	95.935	300	
S6	436718.773	295160.458	97.745	1.890	600			1	1.002	95.855	300
							0	1.003	95.855	300	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
S7	436705.661	295144.705	97.780	2.030	600			1	1.003	95.750	300
								0	1.004	95.750	300
S8	436717.455	295061.026	97.320	1.220	450	600					
								0	3.000	96.100	150
S9	436723.779	295076.260	97.390	1.185	450	600					
								0	4.000	96.205	150
S10	436714.062	295075.904	97.475	2.365	1200			1	4.000	95.260	150
								2	3.000	95.260	150
								0	3.001	95.110	300
S11	436682.803	295089.892	97.320	1.190	450	600					
								0	5.000	96.130	150
S12	436687.549	295097.980	97.485	2.550	1200			1	5.000	95.085	150
								2	3.001	94.935	300
								0	3.002	94.935	300
S13	436679.993	295105.280	97.390	1.110	450						
								0	6.000	96.280	150
S14	436693.729	295101.290	97.390	1.165	600	450					
								0	7.000	96.225	150
S15	436688.989	295103.084	97.485	2.580	600			1	7.000	95.055	150
								2	6.000	95.055	150
								3	3.002	94.905	300
								0	3.003	94.905	300
S16	436724.515	295075.515	97.395	1.060	450						
								0	8.000	96.335	150
S17	436728.360	295072.313	97.505	1.350	450			1	8.000	96.155	150
								0	8.001	96.155	150
S18	436737.409	295070.762	97.390	1.160	450	600					
								0	9.000	96.230	150
S19	436736.488	295082.064	97.620	1.225	450	600					
								0	10.000	96.395	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
S20	436735.128	295080.437	97.570	2.460	1200			1 2 3 0	10.000 9.000 8.001 8.002	95.160 95.160 95.260 95.110	150 150 150 300
S21	436693.172	295102.247	97.395	1.060	450			0	11.000	96.335	150
S22	436696.752	295112.404	97.570	2.745	1200			1 2 3 0	11.000 8.002 3.003 3.004	94.875 94.860 94.825 94.825	150 300 300 300
S23	436684.213	295111.803	97.370	1.060	450			0	12.000	96.310	150
S24	436685.850	295115.410	97.400	1.090	450			0	13.000	96.310	150
S25	436693.291	295118.044	97.620	1.240	450	600		0	14.000	96.380	150
S26	436688.838	295118.996	97.475	2.705	600			1 2 3 4 0	14.000 13.000 12.000 3.004 3.005	94.820 94.820 94.820 94.770 94.770	150 150 150 300 300
S27	436686.872	295122.157	97.445	2.695	1200			1 2 0	3.005 1.004 1.005	94.750 94.750 94.750	300 300 300
Ex SWMH	436659.286	295133.681	96.780	2.900	1200			1	1.005	93.880	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	2160
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations
15 | 30

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0
100	40	0	0

Node S27 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	94.750	Product Number	CTL-SHE-0072-3500-2470-3500
Design Depth (m)	2.470	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node S8 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.220	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.100	Diameter (m)	0.014		

Node S9 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.185	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.1		
Invert Level (m)	96.205	Diameter (m)	0.022		

Node S11 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.190	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.130	Diameter (m)	0.014		

Node S14 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.165	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	96.225	Diameter (m)	0.021		

Node S18 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.160	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.6		
Invert Level (m)	96.230	Diameter (m)	0.016		

Node S19 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.225	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.395	Diameter (m)	0.014		

Node S25 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.240	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	96.380	Diameter (m)	0.014		

Node S20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	95.110
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	128

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	299.0	0.0	1.125	299.0	0.0	1.126	0.0	0.0

Node S10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	95.110
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	11

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	112.0	0.0	1.125	112.0	0.0	1.126	0.0	0.0

Node S8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.000	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	235	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	25.350		

Node S9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	246	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.050		

Node S11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.000	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	180	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.100		

Node S13 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	7.600		

Node S14 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	248	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	17.555		

Node S16 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.075	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	2.550	Inf Depth (m)	
Porosity	0.30	Length (m)	7.600		

Node S18 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.070	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	251	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	22.450		

Node S19 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.300	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	353	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	28.760		

Node S21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.075	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	2.550	Inf Depth (m)	
Porosity	0.30	Length (m)	3.100		

Node S23 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.050	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	5.100		

Node S24 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.080	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	2.550	Inf Depth (m)	
Porosity	0.30	Length (m)	3.100		

Node S25 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	97.300	Slope (1:X)	9999.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	393	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	31.200		

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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	356.0	0.0	0.100	356.0	0.0	0.101	0.0	0.0

Node S4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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	52.0	0.0	0.100	52.0	0.0	0.101	0.0	0.0

Node S5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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	260.0	0.0	0.100	260.0	0.0	0.101	0.0	0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	97.306	0.736	13.4	0.1171	0.0000	SURCHARGED
15 minute winter	S2	12	97.295	0.890	15.9	0.1414	0.0000	SURCHARGED
15 minute winter	S3	12	97.450	1.335	48.8	0.4821	0.0000	FLOOD RISK
15 minute winter	S4	12	97.434	1.339	79.9	0.3790	0.0000	FLOOD RISK
15 minute winter	S5	12	97.271	1.336	76.5	0.3780	0.0000	FLOOD RISK
15 minute winter	S6	12	97.194	1.339	78.8	0.3789	0.0000	SURCHARGED
15 minute winter	S7	12	97.050	1.300	150.3	0.3680	0.0000	SURCHARGED
30 minute winter	S8	32	97.071	0.971	5.3	2.8872	0.0000	FLOOD RISK
30 minute winter	S9	32	97.192	0.987	12.5	7.5324	0.0000	FLOOD RISK
30 minute winter	S10	25	95.512	0.402	68.3	43.2767	0.0000	SURCHARGED
30 minute winter	S11	32	97.063	0.933	4.3	2.1248	0.0000	FLOOD RISK
15 minute summer	S12	10	95.702	0.767	94.5	0.8677	0.0000	SURCHARGED
15 minute winter	S13	10	96.298	0.018	2.1	0.0029	0.0000	OK
30 minute winter	S14	32	97.196	0.971	11.4	6.8656	0.0000	FLOOD RISK
15 minute summer	S15	10	95.768	0.863	92.7	0.2443	0.0000	SURCHARGED
15 minute winter	S16	10	96.368	0.033	3.1	0.0053	0.0000	OK
15 minute winter	S17	10	96.180	0.025	3.1	0.0040	0.0000	OK
30 minute winter	S18	32	97.193	0.963	6.9	4.0050	0.0000	FLOOD RISK
30 minute winter	S19	33	97.400	1.005	7.4	4.5080	0.0000	FLOOD RISK
30 minute winter	S20	179	95.423	0.313	78.0	89.1492	0.0000	SURCHARGED
15 minute winter	S21	10	96.355	0.020	2.4	0.0031	0.0000	OK
15 minute winter	S22	10	95.875	1.050	161.1	1.1873	0.0000	SURCHARGED
15 minute winter	S23	10	96.331	0.021	3.1	0.0033	0.0000	OK
15 minute winter	S24	10	96.319	0.009	0.7	0.0014	0.0000	OK
30 minute winter	S25	33	97.408	1.028	8.2	5.1045	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	-10.6	-0.641	-0.731	0.4318	
15 minute winter	S2	1.001	S5	17.9	1.119	0.702	0.2751	
15 minute winter	S3	2.000	S4	42.7	0.671	0.545	0.2817	
15 minute winter	S4	2.001	S5	75.3	1.166	0.958	2.2355	
15 minute winter	S5	1.002	S6	78.8	1.154	0.743	0.6191	
15 minute winter	S6	1.003	S7	84.3	1.197	1.063	1.4434	
15 minute winter	S7	1.004	S27	151.8	2.155	0.737	2.0668	
30 minute winter	S8	Orifice	S10	0.4				
30 minute winter	S9	Orifice	S10	1.0				
30 minute winter	S10	3.001	S12	-66.9	-1.083	-0.849	2.4295	
30 minute winter	S11	Orifice	S12	0.4				
15 minute summer	S12	3.002	S15	-94.1	-1.337	-1.129	0.3735	
15 minute winter	S13	6.000	S15	2.1	1.113	0.032	0.0872	
30 minute winter	S14	Orifice	S15	0.9				
15 minute summer	S15	3.003	S22	-90.3	-1.282	-1.002	0.8542	
15 minute winter	S16	8.000	S17	3.1	1.271	0.091	0.0122	
15 minute winter	S17	8.001	S20	3.0	1.586	0.058	0.0496	
30 minute winter	S18	Orifice	S20	0.5				
30 minute winter	S19	Orifice	S20	0.4				
30 minute winter	S20	8.002	S22	-75.2	-1.400	-0.960	3.5172	
15 minute winter	S21	11.000	S22	2.4	0.903	0.036	0.1020	
15 minute winter	S22	3.004	S26	-159.1	-2.260	-1.966	0.7253	
15 minute winter	S23	12.000	S26	3.1	0.828	0.041	0.0816	
15 minute winter	S24	13.000	S26	0.7	0.066	0.007	0.0421	
30 minute winter	S25	Orifice	S26	0.4				

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S26	11	96.190	1.420	157.6	0.4019	0.0000	SURCHARGED
15 minute winter	S27	11	96.376	1.626	155.9	1.8386	0.0000	SURCHARGED
15 minute summer	Ex SWMH	1	93.880	0.000	2.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S26	3.005	S27	-154.3	-2.191	-1.899	0.2621	
15 minute winter	S27	Hydro-Brake®	Ex SWMH	2.9				123.6

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	97.592	1.022	15.8	0.1624	0.0000	SURCHARGED
15 minute summer	S2	10	97.538	1.133	23.4	0.1802	0.0000	SURCHARGED
15 minute winter	S3	15	97.532	1.417	113.6	29.6681	0.0000	FLOOD RISK
15 minute winter	S4	14	97.527	1.432	116.1	4.4393	0.0000	FLOOD RISK
15 minute winter	S5	12	97.473	1.538	117.7	6.5997	0.0000	FLOOD RISK
15 minute winter	S6	11	97.465	1.610	118.3	0.4558	0.0000	FLOOD RISK
15 minute winter	S7	9	97.479	1.729	166.5	0.4893	0.0000	SURCHARGED
30 minute winter	S8	33	97.159	1.059	9.7	6.2620	0.0000	FLOOD RISK
30 minute winter	S9	33	97.324	1.119	22.9	15.5065	0.0000	FLOOD RISK
30 minute winter	S10	31	95.836	0.726	88.5	78.0339	0.0000	SURCHARGED
30 minute winter	S11	33	97.151	1.021	7.8	4.7858	0.0000	FLOOD RISK
30 minute winter	S12	30	95.857	0.922	89.0	1.0423	0.0000	SURCHARGED
15 minute winter	S13	10	96.305	0.025	3.8	0.0039	0.0000	OK
30 minute winter	S14	33	97.334	1.109	20.9	14.1364	0.0000	FLOOD RISK
15 minute winter	S15	9	95.928	1.023	110.2	0.2896	0.0000	SURCHARGED
15 minute winter	S16	10	96.381	0.046	5.7	0.0074	0.0000	OK
15 minute winter	S17	10	96.189	0.034	5.7	0.0055	0.0000	OK
30 minute winter	S18	33	97.328	1.098	12.7	8.3807	0.0000	FLOOD RISK
30 minute winter	S19	33	97.510	1.115	13.6	9.2932	0.0000	FLOOD RISK
30 minute winter	S20	306	95.698	0.588	115.3	167.5594	0.0000	SURCHARGED
15 minute winter	S21	10	96.361	0.026	4.4	0.0042	0.0000	OK
15 minute winter	S22	9	96.091	1.266	185.3	1.4314	0.0000	SURCHARGED
15 minute winter	S23	9	96.502	0.192	5.7	0.0305	0.0000	SURCHARGED
15 minute winter	S24	9	96.490	0.180	3.0	0.0286	0.0000	SURCHARGED
30 minute winter	S25	33	97.523	1.143	15.1	10.4140	0.0000	FLOOD RISK

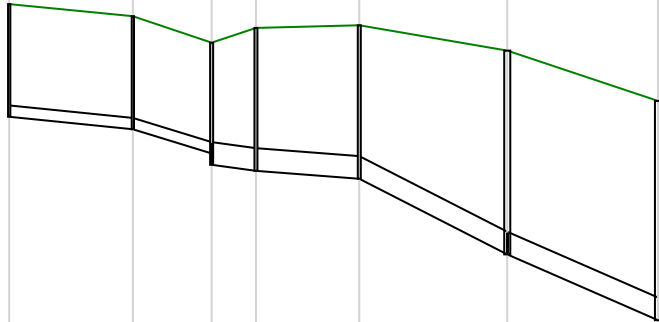
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	11.5	0.796	0.793	0.4318	
15 minute summer	S2	1.001	S5	23.5	1.444	0.920	0.2751	
15 minute winter	S3	2.000	S4	116.1	1.649	1.483	0.2817	
15 minute winter	S4	2.001	S5	116.7	1.657	1.484	2.2355	
15 minute winter	S5	1.002	S6	118.3	1.680	1.116	0.6191	
15 minute winter	S6	1.003	S7	118.9	1.688	1.500	1.4434	
15 minute winter	S7	1.004	S27	165.4	2.348	0.803	2.0668	
30 minute winter	S8	Orifice	S10	0.4				
30 minute winter	S9	Orifice	S10	1.1				
30 minute winter	S10	3.001	S12	-87.1	-1.244	-1.104	2.4295	
30 minute winter	S11	Orifice	S12	0.4				
30 minute winter	S12	3.002	S15	-88.7	-1.259	-1.064	0.3735	
15 minute winter	S13	6.000	S15	3.8	1.160	0.058	0.0902	
30 minute winter	S14	Orifice	S15	1.0				
15 minute winter	S15	3.003	S22	-105.5	-1.499	-1.172	0.8542	
15 minute winter	S16	8.000	S17	5.7	1.485	0.167	0.0192	
15 minute winter	S17	8.001	S20	5.6	1.886	0.108	0.0933	
30 minute winter	S18	Orifice	S20	0.6				
30 minute winter	S19	Orifice	S20	0.4				
30 minute winter	S20	8.002	S22	-111.0	-1.813	-1.417	3.5172	
15 minute winter	S21	11.000	S22	4.4	1.049	0.066	0.1059	
15 minute winter	S22	3.004	S26	-181.2	-2.574	-2.238	0.7253	
15 minute winter	S23	12.000	S26	6.9	1.017	0.092	0.1506	
15 minute winter	S24	13.000	S26	2.4	0.169	0.024	0.0822	
30 minute winter	S25	Orifice	S26	0.4				

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S26	9	96.486	1.716	180.0	0.4856	0.0000	SURCHARGED
15 minute winter	S27	9	96.711	1.961	172.8	2.2184	0.0000	SURCHARGED
15 minute summer	Ex SWMH	1	93.880	0.000	3.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S26	3.005	S27	-170.8	-2.425	-2.103	0.2621	
15 minute winter	S27	Hydro-Brake®	Ex SWMH	3.1				223.9



Node Name								S1	S2	S5	S6	S7	S27	Ex SWMH				
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000																		
Link Name								1.000	1.001	1.002	1.003	1.004	1.005					
Section Type								150mm	150mm	300mm	300mm	300mm	300mm					
Slope (1:X)								148.7	48.8	109	195.2	29.4	34.4					
Cover Level (m)								98.060	97.900	97.550	97.745	97.780	97.445	96.780				
Invert Level (m)								96.570	96.405	96.405	96.085	95.835	95.855	95.750	95.750	94.750	94.750	93.880
Length (m)								24.528	15.625	8.79	20.497	29.350	29.897					



Node Name	S54		S5
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 91.000			
	Link Name	2. 2.001	
	Section Type	30 300mm	
	Slope (1:X)	20 198.4	
	Cover Level (m)	97.550 97.550	97.550
Invert Level (m)		96.095 96.095	95.935
Length (m)	4.	31.745	

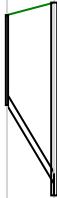


Node Name	S8	S10	S1815	S22	S327
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000					
Link Name	3.000	3.001	3.003	3.003	3.003
Section Type	150mm	300mm	300mm	300mm	300mm
Slope (1:X)	18.2	197.1	171	151.6	187.1
Cover Level (m)	97.320	97.475	97.485	97.485	97.570
Invert Level (m)	96.100	95.260	94.935	94.905	94.825
Length (m)	15.261	34.500	5.12	13.10	3.3



Node Name	S9	S10
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 91.000		
	4.00	
	150r	
	10.3	
	97.390	97.475
Invert Level (m)	96.205 95.260	
Length (m)	9.72	



Node Name	S11 S12	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000		
	Link Name	5.00
	Section Type	150r
	Slope (1:X)	9.0
	Cover Level (m)	97.320 97.485
Invert Level (m)	96.130 95.085	
Length (m)	9.37	



Node Name	S13	S15
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000		
	Link Name	6.00
	Section Type	150r
	Slope (1:X)	7.6
	Cover Level (m)	97.390 97.485
	Invert Level (m)	96.289 96.655
	Length (m)	9.26

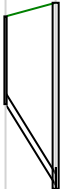


Node Name	S1815
A4 drawing	
Hor Scale 1500	
Ver Scale 100	
Datum (m) 90.000	
Link Name	7.0
Section Type	15
Slope (1:X)	4.3
Cover Level (m)	97.390 97.485
Invert Level (m)	96.955 96.955
Length (m)	5.0



Node Name	S1517 S20 S22		
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000			
	Link Name	8.68.00	8.002
	Section Type	15150n	300mm
	Slope (1:X)	2711.8	199.8
	Cover Level (m)	97.395 97.505	97.570
Invert Level (m)	96.155 96.155 95.260	95.110	94.860
Length (m)	5.10.5	49.946	



Node Name	S18 S20	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 91.000		
	Link Name	9.00
	Section Type	150r
	Slope (1:X)	9.3
	Cover Level (m)	97.390 97.570
Invert Level (m)	96.230 95.160	
Length (m)	9.94	



Node Name	SS120
A4 drawing	
Hor Scale 1500	
Ver Scale 100	
Datum (m) 91.000	
Link Name	1
Section Type	1
Slope (1:X)	1
Cover Level (m)	97.570
Invert Level (m)	95.160 96.395
Length (m)	2



Node Name	S21	S22
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000		
	Link Name	11.00
	Section Type	150m
	Slope (1:X)	7.4
	Cover Level (m)	97.395 97.570
Invert Level (m)	96.335 94.875	
Length (m)	10.76	



Node Name	S23 S26	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000		
	Link Name	12.0
	Section Type	150
	Slope (1:X)	5.7
	Cover Level (m)	97.370 97.475
Invert Level (m)	96.820 96.820	
Length (m)	8.55	



Node Name	S2826	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000		
	Link Name	13
	Section Type	15
	Slope (1:X)	3.
	Cover Level (m)	97.400 97.475
Invert Level (m)	96.820 96.840	
Length (m)	4.	



Node Name	S2526
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 90.000	
Link Name	14
Section Type	15
Slope (1:X)	2.0
Cover Level (m)	97.620 97.475
Invert Level (m)	96.880
Length (m)	4.000

Calculated by:

Jake Heyworth

Site name:

10264

Site location:

MIRA Plot 44

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

52.55265° N

Longitude:

1.46001° W

Reference:

2355897531

Date:

Jul 10 2024 10:45

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

.79

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	642	642
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	3.45	3.45
1 in 1 year (l/s):	2.86	2.86
1 in 30 years (l/s):	6.89	6.89
1 in 100 year (l/s):	8.86	8.86
1 in 200 years (l/s):	10.48	10.48

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.