Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.56%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	S25	465	56.650	1.537	45.1	3.9127	0.0000	SURCHARGED
600 minute summer	END OF PIPE	660	55.146	0.127	27.5	0.0000	0.0000	OK
15 minute winter	S21A	12	57.900	0.180	56.7	0.2033	0.0000	OK
15 minute winter	S20	12	57.836	0.675	384.1	0.9666	0.0000	SURCHARGED
600 minute winter	S26	465	56.651	1.115	5.4	1.9700	0.0000	SURCHARGED
600 minute winter	S27	465	56.651	1.151	5.3	1.3015	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)
600 minute winter	S25	1.015	END OF PIPE	27.5	0.932	0.384	0.6629	1769.0
15 minute winter	S21A	3.001	S10	55.8	1.422	0.527	1.7723	
15 minute winter	S20	2.007	S11	364.3	1.538	1.086	2.9337	
600 minute winter	S26	5.000	S27	5.3	0.175	0.267	7.5186	
600 minute winter	S27	5.001	BASIN A	5.2	0.074	0.109	7.3265	

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Appendix G

Flow Network Calculations (Sensitivity)

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S1	0.039	5.00	67.916	1200	518572.340	134231.181	2.916	65.000
S2	0.039	5.00	67.030	1200	518603.495	134221.248	2.223	64.807
S3	0.039	5.00	66.085	1350	518619.143	134210.535	1.535	64.550
S4	0.039	5.00	65.528	1350	518626.443	134202.518	1.528	64.000
S5	0.039	5.00	64.733	1350	518634.092	134189.000	1.533	63.200
S6	0.091	5.00	63.934	1350	518636.626	134169.571	1.684	62.250
S7	0.091	5.00	65.044	1350	518578.746	134161.529	3.086	61.958
S8	0.091	5.00	64.729	1350	518569.478	134151.602	2.825	61.904
S9	0.091	5.00	63.330	1350	518564.243	134120.701	1.700	61.630
S13	0.091	5.00	62.211	1350	518577.429	134101.428	1.531	60.680
S 14	0.091	5.00	61.461	1350	518613.755	134096.814	1.561	59.900
S 15	0.091	5.00	60.730	1350	518651.204	134095.241	1.530	59.200
S16	0.090	5.00	60.581	1350	518653.158	134089.890	1.731	58.850
S17	0.090	5.00	59.694	1350	518644.526	134048.434	1.694	58.000
S18	0.090	5.00	59.559	1350	518639.883	134044.824	1.859	57.700
S19	0.090	5.00	59.164	1350	518619.478	134044.181	1.850	57.314
S20	0.000		59.661	1350	518571.319	134049.138	2.500	57.161
S21	0.090	5.00	59.989	1350	518511.050	134063.330	2.047	57.942
S21A			59.660	1200	518535.033	134058.797	1.940	57.720
S10	0.090	5.00	60.004	1500	518564.682	134049.861	2.765	57.239
S11	0.091	5.00	59.685	1500	518563.944	134043.156	2.748	56.937
S12	0.091	5.00	57.644	1500	518553.198	134000.054	1.844	55.800
S22	0.091	5.00	58.388	1350	518619.759	133992.622	1.445	56.943
S23	0.091	5.00	58.088	1350	518599.021	133993.291	1.488	56.600
S24			58.088	1500	518578.510	133996.210	2.568	55.520
HW 1.1			57.000		518576.866	133987.534	1.500	55.500
S26	0.091	5.00	57.068	1500	518519.022	134009.090	1.532	55.536
S27	0.000		56.703		518519.107	134000.115	1.203	55.500
BASIN A	0.220	5.00	57.000		518619.692	133973.522	1.695	55.305
S25			57.714	1800	518626.986	133966.349	2.601	55.113
S2176			57.424	1200	518648.752	133960.867	2.405	55.019

Links (Input)

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	32.700	0.600	65.000	64.807	0.193	169.4	225	5.54	50.0
1.001	S2	S3	18.963	0.600	64.807	64.625	0.182	104.2	225	5.79	50.0
1.002	S3	S4	10.843	0.600	64.550	64.000	0.550	19.7	300	5.84	50.0
1.003	S4	S5	15.533	0.600	64.000	63.200	0.800	19.4	300	5.91	50.0
1.004	S5	S6	19.594	0.600	63.200	62.400	0.800	24.5	300	6.02	50.0
1.005	S6	S7	58.436	0.600	62.250	61.958	0.292	200.1	450	6.70	50.0
1.006	S7	S8	13.581	0.600	61.958	61.904	0.054	251.5	450	6.87	50.0
1.007	S8	S9	31.341	0.600	61.904	61.630	0.274	114.4	450	7.15	50.0
1.008	S9	S10	70.841	0.600	61.630	57.389	4.241	16.7	450	7.38	50.0
2.000	S13	S 14	36.619	0.600	60.680	59.900	0.780	46.9	300	5.27	50.0
2.001	S 14	S 15	37.482	0.600	59.900	59.200	0.700	53.5	300	5.56	50.0
2.002	S 15	S16	5.696	0.600	59.200	59.000	0.200	28.5	300	5.59	50.0
2.003	S16	S17	42.345	0.600	58.850	58.000	0.850	49.8	450	5.83	50.0
2.004	S17	S18	5.881	0.600	58.000	57.850	0.150	39.2	450	5.86	50.0
2.005	S18	S19	20.415	0.600	57.700	57.314	0.386	52.9	600	5.96	50.0
2.006	S19	S20	32.313	0.600	57.314	57.161	0.153	211.2	600	6.29	50.0

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Links (Input)

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)
2.007	S20	S11	10.415	0.600	57.161	57.136	0.025	416.6	600	6.43	50.0
3.000	S21	S21A	24.408	0.600	57.942	57.720	0.222	109.9	300	5.27	50.0
1.009	S10	S11	6.745	0.600	57.239	56.937	0.302	22.3	600	7.41	50.0
1.010	S11	S12	44.422	0.600	56.937	55.800	1.137	39.1	600	7.60	50.0
1.011	S12	S24	25.601	0.600	55.800	55.520	0.280	91.4	600	7.76	50.0
1.012	S24	HW 1.1	8.831	0.600	55.520	55.500	0.020	441.6	600	7.89	50.0
1.013	HW 1.1	BASIN A	5.000	0.600	55.500	55.305	0.195	25.6	600	7.91	50.0
4.000	S22	S23	20.748	0.600	56.943	56.600	0.343	60.5	225	5.21	50.0
4.001	S23	S24	20.718	0.600	56.600	55.905	0.695	29.8	225	5.35	50.0
3.001	S21A	S10	30.966	0.600	57.720	57.539	0.181	171.1	300	5.70	50.0
1.014	BASIN A	S25	10.230	0.600	55.305	55.113	0.192	53.3	600	7.96	50.0
1.015	S25	S2176	22.446	0.600	55.113	55.019	0.094	238.8	300	8.33	50.0
5.000	S26	S27	8.975	0.600	55.536	55.500	0.036	249.3	300	5.15	50.0
5.001	S27	BASIN A	104.041	0.600	55.500	55.305	0.195	533.5	300	7.73	50.0

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	32.700	169.4	225	Circular	67.916	65.000	2.691	67.030	64.807	1.998
1.001	18.963	104.2	225	Circular	67.030	64.807	1.998	66.085	64.625	1.235
1.002	10.843	19.7	300	Circular	66.085	64.550	1.235	65.528	64.000	1.228
1.003	15.533	19.4	300	Circular	65.528	64.000	1.228	64.733	63.200	1.233
1.004	19.594	24.5	300	Circular	64.733	63.200	1.233	63.934	62.400	1.234
1.005	58.436	200.1	450	Circular	63.934	62.250	1.234	65.044	61.958	2.636
1.006	13.581	251.5	450	Circular	65.044	61.958	2.636	64.729	61.904	2.375
1.007	31.341	114.4	450	Circular	64.729	61.904	2.375	63.330	61.630	1.250
1.008	70.841	16.7	450	Circular	63.330	61.630	1.250	60.004	57.389	2.165
2.000	36.619	46.9	300	Circular	62.211	60.680	1.231	61.461	59.900	1.261
2.001	37.482	53.5	300	Circular	61.461	59.900	1.261	60.730	59.200	1.230
2.002	5.696	28.5	300	Circular	60.730	59.200	1.230	60.581	59.000	1.281
2.003	42.345	49.8	450	Circular	60.581	58.850	1.281	59.694	58.000	1.244
2.004	5.881	39.2	450	Circular	59.694	58.000	1.244	59.559	57.850	1.259
2.005	20.415	52.9	600	Circular	59.559	57.700	1.259	59.164	57.314	1.250

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1350	Manhole	Adoptable
1.002	S3	1350	Manhole	Adoptable	S4	1350	Manhole	Adoptable
1.003	S4	1350	Manhole	Adoptable	S5	1350	Manhole	Adoptable
1.004	S5	1350	Manhole	Adoptable	S6	1350	Manhole	Adoptable
1.005	S6	1350	Manhole	Adoptable	S7	1350	Manhole	Adoptable
1.006	S7	1350	Manhole	Adoptable	S8	1350	Manhole	Adoptable
1.007	S8	1350	Manhole	Adoptable	S9	1350	Manhole	Adoptable
1.008	S9	1350	Manhole	Adoptable	S10	1500	Manhole	Adoptable
2.000	S13	1350	Manhole	Adoptable	S 14	1350	Manhole	Adoptable
2.001	S 14	1350	Manhole	Adoptable	S 15	1350	Manhole	Adoptable
2.002	S 15	1350	Manhole	Adoptable	S16	1350	Manhole	Adoptable
2.003	S16	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
2.004	S17	1350	Manhole	Adoptable	S18	1350	Manhole	Adoptable
2.005	S18	1350	Manhole	Adoptable	S19	1350	Manhole	Adoptable

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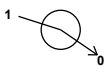
Pipeline Schedule

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)
2.006	32.313	211.2	600	Circular	59.164	57.314	1.250	59.661	57.161	1.900
2.007	10.415	416.6	600	Circular	59.661	57.161	1.900	59.685	57.136	1.949
3.000	24.408	109.9	300	Circular	59.989	57.942	1.747	59.660	57.720	1.640
1.009	6.745	22.3	600	Circular	60.004	57.239	2.165	59.685	56.937	2.148
1.010	44.422	39.1	600	Circular	59.685	56.937	2.148	57.644	55.800	1.244
1.011	25.601	91.4	600	Circular	57.644	55.800	1.244	58.088	55.520	1.968
1.012	8.831	441.6	600	Circular	58.088	55.520	1.968	57.000	55.500	0.900
1.013	5.000	25.6	600	Circular	57.000	55.500	0.900	57.000	55.305	1.095
4.000	20.748	60.5	225	Circular	58.388	56.943	1.220	58.088	56.600	1.263
4.001	20.718	29.8	225	Circular	58.088	56.600	1.263	58.088	55.905	1.958
3.001	30.966	171.1	300	Circular	59.660	57.720	1.640	60.004	57.539	2.165
1.014	10.230	53.3	600	Circular	57.000	55.305	1.095	57.714	55.113	2.001
1.015	22.446	238.8	300	Circular	57.714	55.113	2.301	57.424	55.019	2.105
5.000	8.975	249.3	300	Circular	57.068	55.536	1.232	56.703	55.500	0.903
5.001	104.041	533.5	300	Circular	56.703	55.500	0.903	57.000	55.305	1.395

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.006	S19	1350	Manhole	Adoptable	S20	1350	Manhole	Adoptable
2.007	S20	1350	Manhole	Adoptable	S11	1500	Manhole	Adoptable
3.000	S21	1350	Manhole	Adoptable	S21A	1200	Manhole	Adoptable
1.009	S10	1500	Manhole	Adoptable	S11	1500	Manhole	Adoptable
1.010	S11	1500	Manhole	Adoptable	S12	1500	Manhole	Adoptable
1.011	S12	1500	Manhole	Adoptable	S24	1500	Manhole	Adoptable
1.012	S24	1500	Manhole	Adoptable	HW 1.1		Junction	
1.013	HW 1.1		Junction		BASIN A		Junction	
4.000	S22	1350	Manhole	Adoptable	S23	1350	Manhole	Adoptable
4.001	S23	1350	Manhole	Adoptable	S24	1500	Manhole	Adoptable
3.001	S21A	1200	Manhole	Adoptable	S10	1500	Manhole	Adoptable
1.014	BASIN A		Junction		S25	1800	Manhole	Adoptable
1.015	S25	1800	Manhole	Adoptable	S2176	1200	Manhole	Adoptable
5.000	S26	1500	Manhole	Adoptable	S27		Junction	
5.001	S27		Junction		BASIN A		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	518572.340	134231.181	67.916	2.916	1200		0	1.000	65.000	225
S2	518603.495	134221.248	67.030	2.223	1200	1	1.000	64.807	225
							0	1.001	64.807	225
S3	518619.143	134210.535	66.085	1.535	1350	1	1.001	64.625	225
							0	1.002	64.550	300

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S4	518626.443	134202.518	65.528	1.528	1350	1	1.002	64.000	300
						0	1.003	64.000	300
S5	518634.092	134189.000	64.733	1.533	1350	1	1.003	63.200	300
						0	1.004	63.200	300
S6	518636.626	134169.571	63.934	1.684	1350	1	1.004	62.400	300
						0	1.005	62.250	450
S7	518578.746	134161.529	65.044	3.086	1350	1	1.005	61.958	450
						0	1.006	61.958	450
S8	518569.478	134151.602	64.729	2.825	1350	1	1.006	61.904	450
						0	1.007	61.904	450
S9	518564.243	134120.701	63.330	1.700	1350	1	1.007	61.630	450
						0	1.008	61.630	450
S13	518577.429	134101.428	62.211	1.531	1350				
						0	2.000	60.680	300
S 14	518613.755	134096.814	61.461	1.561	1350	1	2.000	59.900	300
						0	2.001	59.900	300
S 15	518651.204	134095.241	60.730	1.530	1350	1	2.001	59.200	300
						0	2.002	59.200	300
S16	518653.158	134089.890	60.581	1.731	1350	1	2.002	59.000	300
						0	2.003	58.850	450
S17	518644.526	134048.434	59.694	1.694	1350	1	2.003	58.000	450
						0	2.004	58.000	450
S18	518639.883	134044.824	59.559	1.859	1350	1	2.004	57.850	450
						0	2.005	57.700	600
S19	518619.478	134044.181	59.164	1.850	1350	1	2.005	57.314	600
						0	2.006	57.314	600

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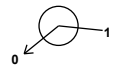
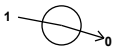
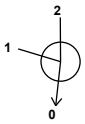
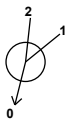
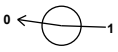
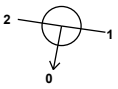
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S20	518571.319	134049.138	59.661	2.500	1350	1	2.006	57.161	600
									
						0	2.007	57.161	600
S21	518511.050	134063.330	59.989	2.047	1350				
						0	3.000	57.942	300
S21A	518535.033	134058.797	59.660	1.940	1200	1	3.000	57.720	300
									
						0	3.001	57.720	300
S10	518564.682	134049.861	60.004	2.765	1500	1	3.001	57.539	300
						2	1.008	57.389	450
									
						0	1.009	57.239	600
S11	518563.944	134043.156	59.685	2.748	1500	1	2.007	57.136	600
						2	1.009	56.937	600
									
						0	1.010	56.937	600
S12	518553.198	134000.054	57.644	1.844	1500	1	1.010	55.800	600
									
						0	1.011	55.800	600
S22	518619.759	133992.622	58.388	1.445	1350				
						0	4.000	56.943	225
S23	518599.021	133993.291	58.088	1.488	1350	1	4.000	56.600	225
									
						0	4.001	56.600	225
S24	518578.510	133996.210	58.088	2.568	1500	1	4.001	55.905	225
						2	1.011	55.520	600
									
						0	1.012	55.520	600
HW 1.1	518576.866	133987.534	57.000	1.500		1	1.012	55.500	600
									
						0	1.013	55.500	600
S26	518519.022	134009.090	57.068	1.532	1500				
						0	5.000	55.536	300
S27	518519.107	134000.115	56.703	1.203		1	5.000	55.500	300
									
						0	5.001	55.500	300
BASIN A	518619.692	133973.522	57.000	1.695		1	5.001	55.305	300
						2	1.013	55.305	600
									
						0	1.014	55.305	600

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S25	518626.986	133966.349	57.714	2.601	1800		1	1.014	55.113	600
							0	1.015	55.113	300
S2176	518648.752	133960.867	57.424	2.405	1200		1	1.015	55.019	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	4320	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node S25 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	55.113	Product Number	CTL-SHE-0079-3400-1587-3400
Design Depth (m)	1.587	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.4	Min Node Diameter (mm)	1200

Node S25 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	56.100	Product Number	CTL-SHE-0222-2460-0600-2460
Design Depth (m)	0.600	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	24.6	Min Node Diameter (mm)	1500

Node BASIN A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	55.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	810

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.6	0.0	0.500	876.0	0.0	1.000	1225.7	0.0	1.500	1590.7	0.0
0.100	173.1	0.0	0.600	944.8	0.0	1.100	1297.3	0.0	1.600	1665.2	0.0
0.200	368.4	0.0	0.700	1014.1	0.0	1.200	1369.6	0.0	1.700	1740.7	0.0
0.300	631.3	0.0	0.800	1084.1	0.0	1.300	1442.4	0.0			
0.400	807.8	0.0	0.900	1154.6	0.0	1.400	1515.8	0.0			

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	11	65.301	0.301	32.6	0.3401	0.0000	SURCHARGED
15 minute summer	S2	11	65.160	0.353	62.4	0.3993	0.0000	SURCHARGED
15 minute summer	S3	11	64.691	0.141	93.7	0.2016	0.0000	OK
15 minute summer	S4	11	64.164	0.164	125.0	0.2342	0.0000	OK
15 minute summer	S5	11	63.610	0.410	156.1	0.5871	0.0000	SURCHARGED
15 minute summer	S6	11	63.096	0.846	225.8	1.2100	0.0000	SURCHARGED
15 minute summer	S7	11	62.751	0.793	298.2	1.1354	0.0000	SURCHARGED
15 minute summer	S8	11	62.544	0.640	370.4	0.9157	0.0000	SURCHARGED
15 minute summer	S9	11	61.868	0.237	441.8	0.3399	0.0000	OK
15 minute summer	S13	12	60.829	0.149	76.1	0.2136	0.0000	OK
15 minute summer	S 14	12	60.694	0.794	151.7	1.1358	0.0000	SURCHARGED
15 minute summer	S 15	12	60.092	0.892	212.5	1.2764	0.0000	SURCHARGED
15 minute summer	S16	12	59.734	0.884	280.8	1.2644	0.0000	SURCHARGED
15 minute summer	S17	12	59.417	1.417	339.6	2.0272	0.0000	FLOOD RISK
15 minute summer	S18	12	59.263	1.563	393.2	2.2372	0.0000	FLOOD RISK
15 minute summer	S19	12	59.164	1.850	459.2	2.6474	1.5213	FLOOD
15 minute summer	S20	12	58.998	1.837	433.6	2.6284	0.0000	SURCHARGED
15 minute summer	S21	12	59.271	1.329	75.3	1.9015	0.0000	SURCHARGED
15 minute summer	S21A	12	59.176	1.456	69.4	1.6470	0.0000	SURCHARGED
15 minute summer	S10	12	59.048	1.809	563.2	3.1970	0.0000	SURCHARGED
15 minute summer	S11	12	58.907	1.970	1019.4	3.4813	0.0000	SURCHARGED
15 minute summer	S12	12	57.595	1.795	1081.6	3.1720	0.0000	FLOOD RISK
15 minute summer	S22	11	58.388	1.445	76.1	2.0678	0.9977	FLOOD
15 minute summer	S23	11	58.086	1.486	139.7	2.1262	0.0000	FLOOD RISK
960 minute summer	S24	660	56.865	1.345	152.8	2.3763	0.0000	SURCHARGED

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	31.3	0.843	0.787	1.3005	
15 minute summer	S2	1.001	S3	62.6	1.575	1.230	0.7344	
15 minute summer	S3	1.002	S4	93.9	2.697	0.373	0.3892	
15 minute summer	S4	1.003	S5	124.4	2.755	0.491	0.8521	
15 minute summer	S5	1.004	S6	159.2	2.933	0.706	1.3798	
15 minute summer	S6	1.005	S7	225.5	1.424	0.989	9.2588	
15 minute summer	S7	1.006	S8	297.7	1.879	1.466	2.1518	
15 minute summer	S8	1.007	S9	369.2	2.747	1.222	3.8124	
15 minute summer	S9	1.008	S10	437.7	4.285	0.551	8.6172	
15 minute summer	S13	2.000	S 14	75.7	1.509	0.465	1.9301	
15 minute summer	S 14	2.001	S 15	136.4	1.937	0.896	2.6395	
15 minute summer	S 15	2.002	S16	205.6	2.919	0.984	0.4011	
15 minute summer	S16	2.003	S17	264.3	2.275	0.576	6.7093	
15 minute summer	S17	2.004	S18	321.5	2.822	0.621	0.9318	
15 minute summer	S18	2.005	S19	387.5	1.711	0.409	5.7504	
15 minute summer	S19	2.006	S20	433.6	1.540	0.918	9.1018	
15 minute summer	S20	2.007	S11	423.1	1.502	1.261	2.9337	
15 minute summer	S21	3.000	S21A	69.4	1.375	0.655	1.7188	
15 minute summer	S21A	3.001	S10	62.4	1.364	0.736	2.1806	
15 minute summer	S10	1.009	S11	552.2	2.159	0.378	1.8999	
15 minute summer	S11	1.010	S12	1021.9	3.628	0.926	12.5127	
15 minute summer	S12	1.011	S24	1086.2	3.857	1.508	7.2112	
15 minute summer	S22	4.000	S23	63.6	1.599	0.950	0.8252	
15 minute summer	S23	4.001	S24	129.1	3.247	1.351	0.8240	
960 minute summer	S24	1.012	HW 1.1	134.6	0.984	0.413	2.4875	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	HW 1.1	660	56.865	1.365	174.7	0.0000	0.0000	FLOOD RISK
960 minute summer	S26	660	56.865	1.329	7.1	2.3477	0.0000	FLOOD RISK
120 minute summer	S27	116	56.703	1.203	32.4	0.0000	0.0000	FLOOD RISK
960 minute summer	BASIN A	660	56.864	1.559	158.5	1575.9430	0.0000	FLOOD RISK
960 minute summer	S25	660	56.864	1.751	38.8	4.4566	0.0000	SURCHARGED
960 minute summer	S2176	660	55.154	0.135	31.0	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)
960 minute summer	HW 1.1	1.013	BASIN A	149.3	1.051	0.110	1.4084	
960 minute summer	S26	5.000	S27	6.9	0.284	0.099	0.6320	
120 minute summer	S27	5.001	BASIN A	31.7	0.451	0.666	7.3265	
960 minute summer	BASIN A	1.014	S25	38.8	0.333	0.041	2.8816	
960 minute summer	S25	1.015	S2176	31.0	0.963	0.433	0.7234	2397.4

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Appendix H

West Sussex SuDS Proforma

Surface Water Drainage Proforma

West Sussex County Council (WSCC) as Lead Local Flood Authority recommends this proforma is completed and submitted to support any planning application for a major development. The information contained in this form will be used by WSCC officers in their role as 'statutory consultee' on surface water drainage. The proforma should accompany the site-specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

1. Site Details

No.	Requirement	Answer	Application Type
1.1	Address including postcode	Land North of Horsham	Outline & Full
1.2	OS grid reference (easting and northing)	518589, 134083	Outline & Full
1.3	Planning application reference		Outline & Full
1.4	Total site area (hectares)	3.43	Outline & Full
1.5	Pre-development use	Greenfield site	Outline & Full
1.6	Proposed design life		Outline & Full
1.7	Have agreements in principle for discharge been provided (where applicable)? (YES/NO)	Yes	
1.8	Topographic Survey Plan showing existing site layout, site levels and drainage system	Yes	Outline & Full

2. Discharge Hierarchy/Methods of Discharge[1]

No.	Requirement	Answer	Application Type
2.1	Store rainwater for later use (reuse) (YES/NO)	NO	Full
2.2	Infiltration techniques such as soakaways, permeable paving, etc (YES/NO)	NO	Outline & Full
2.3	Hybrid (YES/NO)	NO	Outline & Full

[1] Runoff may be discharged via one or multiple methods.

No.	Requirement	Answer	Application Type
2.4	Attenuation with restricted discharge to watercourse (YES/NO)	NO	Outline & Full
2.5	Attenuation with restricted discharge to surface water sewer (YES/NO)	YES	Outline & Full
2.6	Attenuation with restricted discharge to combined sewer (YES/NO)	NO	Outline & Full

3. Calculation Inputs

No.	Requirement	Answer	Application Type
3.1	Area within site which is drained by SuDS[2] (hectares)	2.047 ha (includes urban creep, as agreed in DC/24/0446	Outline & Full
3.2	Impermeable area drained pre-development[3] (hectares)		Outline & Full
3.3	Impermeable area drained post-development[3] (hectares)	2.047 ha	Outline & Full
3.4	Urban Creep (hectares)	0.183 ha	Outline & Full
3.5	Climate change factor applied (1 in 30 and 1 in 100) (percentage)	20% climate change and 40% for exceedence in the 1 in 100 year. Climate change for 1 in 30 year is not considered, part of the approved Reserved Matters Application DC/24/0446	Outline & Full

4. Infiltration Feasibility/Ground Investigations

No.	Requirement	Answer	Application Type
4.1	Has winter groundwater monitoring and infiltration been undertaken? (YES/NO)	Yes	Outline & Full
4.2	Period of winter groundwater monitoring (from/to)	Yes	Outline & Full
4.3	Depth to highest recorded groundwater level (mAOD)	2.2 mbgl	Full
4.4	Infiltration rate		Outline & Full

[2] Impermeable area should be measured pre and post development. Impermeable surfaces include roofs, pavements, driveways and paths, where runoff is conveyed to the drainage system.

[3] 10% Urban Creep should be added to the volumes required for storage and not increase discharge rates.

No.	Requirement	Answer	Application Type
4.5	Depth of infiltration structure (mAOD)	N/A	Full
4.6	Safety factor used for sizing infiltration storage	N/A	Outline & Full

5. Calculation Outputs: Greenfield Runoff Rates[4]

No.	Requirement	Answer	Application Type
5.1	Qbar (l/s)	5.20	Outline & Full
5.2	1 in 2 year rainfall (l/s)	4.40	Outline & Full
5.3	1 in 30 year rainfall (l/s)	11.80	Outline & Full
5.4	1 in 100 year rainfall (l/s)	16.50	Outline & Full

6. Calculation Outputs: Brownfield Runoff Rates (including Urban Creep) (if applicable)

No.	Requirement	Answer	Application Type
6.1	1 in 1 year rainfall (l/s)	N/A	Outline & Full
6.2	1 in 30 year rainfall (l/s)	N/A	Outline & Full
6.3	1 in 100 year rainfall (l/s)	N/A	Outline & Full

7. Calculation Outputs: Volume Control/Infiltration Provision

No.	Requirement	Answer	Application Type
7.1	Infiltration (m^3)		Outline & Full
7.2	Attenuation (m^3)	1,321m^3	Outline & Full
7.3	Separate volume designated as long-term storage[5] (m^3)		Full
7.4	Total volume control (sum of inputs for 7.1 to 7.3) (m^3)		Full

[4] Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 litres per second per hectare (l/s/ha).

[5] In calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable, and CV values must equal 1.

8. Calculation Outputs: Attenuation/Restricted Discharge

No.	Requirement		Answer	Application Type
8.1	Proposed discharge rate (critical storm)	1 in 1 (100%) AEP (m/s)	3.54 l/s	Outline & Full
		1 in 30 (3.33%) AEP (m/s)	20 l/s	Outline & Full
		1 in 30 (3.33%) AEP plus climate change (m/s)		Outline & Full
		1 in 100 (1%) AEP (m/s)	28.0 l/s	Outline & Full
		1 in 100 (1%) AEP plus climate change (m/s)	28.0 l/s	Outline & Full
8.2	Calculations show critical storm durations (both by max height and max discharge) for 1 in 1, 1 in 30, 1 in 30 plus climate change, 1 in 100 and 1 in 100 year plus climate change allowance can be accommodated on site (YES/NO)		Yes	Outline & Full
8.3	Has treatment of potential contaminants been considered? (YES/NO)		Yes	Outline & Full
8.4	Demonstration of source control features with substantive evidence why these cannot be used if not (YES/NO)		Yes	Full
8.5	If discharging into a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? (YES/NO)		No	Full

9. Other Supporting Details

No.	Requirement	Answer	Application Type
9.1	Plan detailing location of groundwater monitoring and infiltration testing	Yes	Outline & Full
9.2	Detailed drainage design layout	Yes	Full
9.3	Maintenance strategy	Yes	Full

No.	Requirement	Answer	Application Type
9.4	Detailed development layout	Yes	Full
9.5	Impermeable area plan	No	Full
9.6	Phasing plan?	No	Full
9.7	If ground levels are being raised over 300mm above existing levels and is unavoidable, have detailed plans been provided, together with drainage proposals, to address any potential drainage related issues?	Yes	Full

The above form should be completed using evidence from information which should be appended to this form. The information being submitted should be proportionate to the site conditions, flood risks and magnitude of development. It should serve as a summary of the drainage proposals and should clearly show that the proposed discharge rate and volume as a result of development will not be increasing. Where there is an increase in discharge rate or volume, then the relevant section of this form must be completed with clear evidence demonstrating how the requirements will be met.

This form is completed using factual information and can be used as a summary of the surface water drainage strategy on this site.

Form completed by	Dominic Cronin
Qualification of person responsible for signing off this proforma	BEng Civil Engineering
Company	Ardent Consulting
On behalf of (client's details)	Bellway
Date	13/028/26

Appendix I

SuDS Maintenance Plan

Maintenance and Management

The attenuation basins, swales, connecting pipework, chambers, and flow controls would be maintained by a management company set up by the developer. As construction has not yet commenced, the process of finalising the management company contract has not yet commenced. The developer will ensure that the measures as outlined below form part of the management company contract details, for the ongoing maintenance of all SuDS features on site.
The indicative maintenance requirements for each proposed SuDS component is given below. Taken from CIRIA report C753 "The SuDS Manual".

This maintenance strategy is to be read in conjunction Glanville's Drainage Statement's (ref: 119_8220585_JD_Drainage_Statement_MRE) SuDS Management and Maintenance Plan found in Appendix I.

Drainage Pipes and Manholes

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove sediment and debris from inspection chambers and flow control chambers	Annually
	Cleaning of gutters and any filters on downpipes	Annually
	Remove any root ingress	As required
Occasional Maintenance	CCTV survey of drains to check alignment, cracking and joint displacement	10 year intervals

Permeable Paving

Maintenance schedule	Maintenance Task	Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attenuation to areas where water runs into pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Tree Pit/Rain Garden

Maintenance schedule	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Inspect monthly
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly