

Flood Risk Assessment Technical Note Addendum

Response to LLFA.

Project name: Land at High Street Sutton Benger
Author: Mark Wheeler
Date: 28th January 2026
Project number: P25-2384

This note is intended to be provided to Wiltshire Council Planning Department, in response to the comments from the LLFA for the planning application reference PL/2025/09568.

Environment Agency (LLFA) comments Date: 17th December 2025

For clarity, this Tech Note will provide a response to the points raised by the LLFA, at the end of this note we have provided appendices with drawings and storm drainage calculations.

LLFA Comments with responses in red.

- 1) Calculations and drawings for the drainage system showing designated holding areas and conveyance routes based on no flooding on site for a 1 in 30-year rainfall event.

Drainage calculations under normal conditions (no surcharged outfall) have been provided in **Appendix A**. An updated drainage strategy, impermeable area plan and flood exceedance plan have been provided in **Appendix B, C and D** respectively. The calculations show that there is no flooding for a 1 in 30-year rainfall event.

- 2) Calculations and drawings for the drainage system showing designated holding areas and conveyance routes based on no flooding on site for a 1 in 100 year plus climate change rainfall event in respect to a building (including basement) or utility plant susceptible to water within the development.

Please note any flooding within the network under 10m³ is assumed to be able to be stored within the adoptable highway or private roads, levels within the detailed design stage will ensure that any flooding will be directed away from dwellings. Please note the maximum flooding from a manhole is 6.1 m³ for manhole S18 for the critical 1 in 100-year + 45% Climate Change rainfall event. Some private drainage has been modelled in order to provide more storage in the model for manholes with flooding. It should be noted that flooding is more localised at heads of pipe runs.

- 3) Calculations that demonstrate sufficient sensitivity analysis of the on-site drainage network has been undertaken for surcharged outfall conditions, at a sufficient volume to fully attenuate the 1 in 100yr +45% climate change.

Drainage calculations have been produced for a surcharged outfall for two scenarios. The first scenario is if the drainage ditch is at full capacity and the water level is assumed to be at the top of the bank at a

level of 52.54 mAOD and is shown in **Appendix E**. This is an unlikely scenario due to the water level having been surveyed twice previously at levels of 51.01 mAOD and 51.38 mAOD. However, if this does happen, it is shown in the calculations that no extra flooding on site will be caused by this.

The second scenario analysed is the worst-case water level surveyed on site of 51.38 mAOD, this also shows there will be no extra flooding on site and is shown in **Appendix F**.

To model the surcharged outfall, a surcharged outfall hydrograph was assigned to HW3 node. The depth was calculated from the water level minus the invert level of HW3.

- 4) Calculations and details that demonstrate the proposed drainage design provides a sufficient level of water treatment.

The surface water drainage system will ensure that a sufficient level of water quality treatment is provided to ensure that the proposed development does not have any adverse impact on the receiving network.

The SuDS Manual (CIRIA C753) states that the design of surface water drainage should consider minimising contaminants in surface water runoff discharged from the site. The level of treatment required depends on the proposed land use, according to the pollution hazard indices.

Table 1 shows the pollution hazard indices for the sites land classification. The pollution hazard level has been assumed to be low pollution hazard level.

Table 1 – Proposed Development pollution hazard indices

Land Use	Pollution Hazard Level	TSS	Metals	Hydrocarbons
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and nonresidential car parking with infrequent change (eg schools, offices) ie <300traffic movements/day	Low	0.5	0.4	0.4

Table 2 shows the indicative SuDS Mitigation indices for the proposed development.

Table 2 – Indicative SuDS Mitigation Indices

Type of SuDS component	Total suspended solids (TSS)	Metals	Hydrocarbons
Detention Basin	0.5	0.5	0.6

Table 2 shows that sufficient water treatment has been provided.

- 5) Calculations that demonstrate the required 20% betterment against greenfield rates has been achieved for all storm events between the 1 in 1 year and the 1 in 100year return period storm events.

As per the outline planning Flood Risk Assessment, the greenfield runoff rates shown in **Table 3** have been used which contain a 20% betterment on greenfield runoff rates.

Table 3 – IOH 124 surface water runoff (greenfield).

Return Period	Peak Flow (l/s)	20% Reduction in Peak Flow
QBar	9.5	7.60
1 in 1 year	7.41	5.92
1 in 30 year	18.53	14.82
1 in 100 year	23.09	18.47

The proposed hydrobrake has been limited to 5.9 l/s so should be satisfactory for the above comment.

- 6) A drainage plan for the site showing overland exceedance routes for flows in excess of the 1 in 100 year plus climate change (40%) rainfall event.

As discussed in point 2, a flood exceedance plan for the 1 in 100-year + 45% Climate change rainfall event has been produced showing exceedance routes and is shown in **Appendix D**. Exceedance flows would be directed away from buildings and follow the proposed site levels towards the highways / open space / SuDS features / allotments.

- 7) Sufficient detail regarding the lining of any attenuation pond to demonstrate that any interface with groundwater can be safely managed.

Lining of the attenuation pond is not required as groundwater was not encountered within trial pit TPO4. **Appendix G** shows the water sampling and trial pit location plan and **Appendix H** shows the trial pit log for TPO4.

Conclusion

Within the information included within the responses and appendices, I hope this will enable you to remove your objection to the planning application.

Mark Wheeler

Senior Infrastructure Engineer

28.01.2026

Appendix A

(Flow storm drainage calculations under normal circumstances)

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	21.000	Minimum Backdrop Height (m)	0.200
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	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
S2	0.062	5.00	54.601	394936.747	178816.667	1.491
S4	0.030	5.00	54.744	394935.011	178829.804	1.690
S6	0.005	5.00	54.885	394942.014	178843.115	1.900
S8	0.058	5.00	54.893	394952.014	178845.092	1.953
SW-IC5	0.021	5.00	54.700	395018.236	178742.679	1.300
SW-IC6	0.000		54.500	395011.342	178741.767	1.237
S10	0.030	5.00	54.531	395006.009	178747.664	1.500
S12	0.110	5.00	54.448	395001.196	178779.544	1.625
S14	0.039	5.00	54.533	395000.895	178793.855	1.783
S16	0.108	5.00	54.431	395010.052	178812.972	1.846
SW-IC1	0.015	5.00	54.000	395113.793	178818.581	0.900
SW-IC2	0.023	5.00	53.950	395111.475	178833.066	1.100
SW-IC3	0.010	5.00	54.000	395101.006	178866.592	0.900
SW-IC4	0.025	5.00	54.200	395103.035	178860.205	1.250
S18	0.047	5.00	53.950	395107.073	178849.014	1.504
S20	0.139	5.00	54.796	395027.683	178878.304	1.575
S22	0.097	5.00	54.281	395039.390	178839.784	1.576
S24	0.114	5.00	54.191	395050.836	178829.330	2.017
S26	0.053	5.00	54.564	395033.959	178799.861	2.544
S28	0.105	5.00	53.904	395082.605	178772.569	2.004
S30	0.089	5.00	53.466	395092.778	178743.854	1.159
S32	0.019	5.00	53.828	395087.198	178764.243	1.948
HW1			53.208	395099.736	178770.259	1.358
HW2			53.208	395125.277	178779.264	1.508
S34	0.084	5.00	53.686	395105.553	178785.771	1.406
S36 (HB)	0.017	5.00	53.871	395129.804	178788.026	2.227
S38			53.914	395114.313	178847.155	2.404
S40			53.878	395106.261	178876.164	2.435
S42			53.726	395077.094	178976.796	2.513
HW3			52.500	395045.886	179082.495	1.529

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S2	S4	13.251	53.110	53.054	0.056	236.6	300	5.22	50.0
1.001	S4	S6	15.041	53.054	52.985	0.069	218.0	300	5.45	50.0
1.002	S6	S8	10.194	52.985	52.940	0.045	226.5	300	5.62	50.0
1.003	S8	S16	66.333	52.940	52.660	0.280	236.9	300	6.70	50.0
Private 2.0	SW-IC5	SW-IC6	6.954	53.400	53.313	0.087	80.0	100	5.13	50.0
Lateral 2	SW-IC6	S10	7.951	53.263	53.181	0.082	97.0	150	5.26	50.0
2.000	S10	S12	32.241	53.031	52.898	0.133	242.4	300	5.80	50.0
2.001	S12	S14	14.314	52.823	52.750	0.073	196.1	375	5.98	50.0
2.002	S14	S16	21.197	52.750	52.585	0.165	128.5	375	6.21	50.0
1.004	S16	S26	27.266	52.585	52.170	0.415	65.7	375	6.91	50.0
Private 4.0	SW-IC1	SW-IC2	14.669	53.100	52.900	0.200	73.3	100	5.27	50.0
Lateral 4	SW-IC2	S18	16.544	52.850	52.671	0.179	92.4	150	5.54	50.0
Private 5.0	SW-IC3	SW-IC4	6.702	53.100	53.000	0.100	67.0	100	5.12	50.0
Lateral 5	SW-IC4	S18	11.897	52.950	52.671	0.279	42.6	150	5.25	50.0
3.000	S18	S24	59.582	52.446	52.249	0.197	302.4	375	6.49	50.0
4.000	S20	S22	40.260	53.221	52.705	0.516	78.0	375	5.33	50.0
4.001	S22	S24	15.502	52.705	52.249	0.456	34.0	375	5.41	50.0
3.001	S24	S26	33.960	52.174	52.095	0.079	429.9	450	7.07	50.0
1.005	S26	S28	55.779	52.020	51.900	0.120	464.8	525	7.98	50.0
1.006	S28	S32	9.509	51.900	51.880	0.020	475.4	525	8.13	50.0
5.000	S30	S32	21.139	52.307	52.180	0.127	166.4	225	5.35	50.0
1.007	S32	HW1	13.907	51.880	51.850	0.030	463.6	525	8.36	50.0
1.008	HW1	HW2	27.082	51.850	51.700	0.150	180.5	750	8.57	50.0
1.009	HW2	S36 (HB)	9.862	51.700	51.644	0.056	176.1	525	8.67	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	1.018	71.9	8.4	1.191	1.390	0.062	0.0	69	0.686
1.001	1.061	75.0	12.5	1.390	1.600	0.092	0.0	82	0.791
1.002	1.040	73.5	13.1	1.600	1.653	0.097	0.0	85	0.791
1.003	1.017	71.9	21.0	1.653	1.471	0.155	0.0	111	0.887
Private 2.0	0.861	6.8	2.8	1.200	1.087	0.021	0.0	45	0.821
Lateral 2	1.020	18.0	2.8	1.087	1.200	0.021	0.0	40	0.745
2.000	1.005	71.1	6.9	1.200	1.250	0.051	0.0	63	0.644
2.001	1.290	142.5	21.8	1.250	1.408	0.161	0.0	99	0.942
2.002	1.597	176.4	27.1	1.408	1.471	0.200	0.0	99	1.166
1.004	2.238	247.2	62.7	1.471	2.019	0.463	0.0	129	1.882
Private 4.0	0.900	7.1	2.0	0.800	0.950	0.015	0.0	37	0.781
Lateral 4	1.045	18.5	5.1	0.950	1.129	0.038	0.0	54	0.898
Private 5.0	0.942	7.4	1.4	0.800	1.100	0.010	0.0	29	0.720
Lateral 5	1.545	27.3	4.7	1.100	1.129	0.035	0.0	42	1.166
3.000	1.036	114.5	16.3	1.129	1.567	0.120	0.0	95	0.740
4.000	2.053	226.7	18.8	1.200	1.201	0.139	0.0	72	1.258
4.001	3.116	344.2	32.0	1.201	1.567	0.236	0.0	77	1.979
3.001	0.974	154.9	63.7	1.567	2.019	0.470	0.0	201	0.928
1.005	1.032	223.4	133.6	2.019	1.479	0.986	0.0	293	1.076
1.006	1.020	220.9	147.9	1.479	1.423	1.091	0.0	315	1.090
5.000	1.010	40.2	12.1	0.934	1.423	0.089	0.0	84	0.884
1.007	1.033	223.7	162.5	1.423	0.833	1.199	0.0	333	1.123
1.008	2.079	918.6	162.5	0.608	0.758	1.199	0.0	211	1.586
1.009	1.684	364.6	162.5	0.983	1.702	1.199	0.0	245	1.638

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
6.000	S34	S36 (HB)	24.356	52.280	51.944	0.336	72.5	225	5.26	50.0
1.010	S36 (HB)	S38	61.125	51.644	51.510	0.134	456.2	525	9.65	50.0
1.011	S38	S40	30.106	51.510	51.443	0.067	449.3	525	10.13	50.0
1.012	S40	S42	104.774	51.443	51.213	0.230	455.5	525	11.80	48.3
1.013	S42	HW3	110.210	51.213	50.971	0.242	455.4	525	13.56	44.7

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)
6.000	1.538	61.1	11.4	1.181	1.702	0.084	0.0	65	1.182
1.010	1.042	225.6	176.2	1.702	1.879	1.300	0.0	350	1.147
1.011	1.050	227.3	176.2	1.879	1.910	1.300	0.0	348	1.154
1.012	1.043	225.7	170.3	1.910	1.988	1.300	0.0	342	1.141
1.013	1.043	225.7	157.4	1.988	1.004	1.300	0.0	324	1.124

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	10000
M5-60 (mm)	21.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	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 %)
2	0	0	0
30	0	0	0
100	45	0	0

Node S36 (HB) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	51.644	Product Number	CTL-SHE-0107-5900-1500-5900
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.9	Min Node Diameter (mm)	1200

Node HW2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	51.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	1785

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	10	53.197	0.087	11.9	0.1241	0.0000	OK
15 minute winter	S4	10	53.159	0.105	17.5	0.1496	0.0000	OK
15 minute winter	S6	11	53.100	0.115	18.2	0.1303	0.0000	OK
15 minute winter	S8	11	53.072	0.132	28.8	0.1489	0.0000	OK
15 minute winter	SW-IC5	10	53.459	0.059	4.0	0.0840	0.0000	OK
15 minute winter	SW-IC6	11	53.313	0.050	3.9	0.0714	0.0000	OK
15 minute winter	S10	11	53.106	0.075	9.6	0.1073	0.0000	OK
15 minute winter	S12	10	52.949	0.126	30.0	0.1800	0.0000	OK
15 minute winter	S14	10	52.874	0.124	37.2	0.1400	0.0000	OK
15 minute winter	S16	11	52.738	0.153	84.0	0.2196	0.0000	OK
15 minute winter	SW-IC1	10	53.145	0.045	2.9	0.0646	0.0000	OK
15 minute winter	SW-IC2	10	52.917	0.067	7.2	0.0955	0.0000	OK
15 minute winter	SW-IC3	10	53.136	0.036	1.9	0.0513	0.0000	OK
15 minute winter	SW-IC4	10	53.002	0.052	6.7	0.0750	0.0000	OK
15 minute winter	S18	11	52.556	0.110	22.6	0.1945	0.0000	OK
15 minute winter	S20	10	53.308	0.087	26.6	0.1246	0.0000	OK
15 minute winter	S22	10	52.795	0.090	44.9	0.1289	0.0000	OK
15 minute winter	S24	11	52.506	0.332	87.7	0.4749	0.0000	OK
15 minute winter	S26	10	52.454	0.434	187.4	0.6217	0.0000	OK
15 minute summer	S28	10	52.385	0.485	198.4	0.8564	0.0000	OK
15 minute winter	S30	11	52.411	0.104	17.1	0.1486	0.0000	OK
15 minute summer	S32	10	52.359	0.479	220.0	0.8470	0.0000	OK
15 minute winter	HW1	9	52.316	0.466	236.3	0.6673	0.0000	OK
360 minute winter	HW2	336	52.065	0.365	32.7	206.7221	0.0000	OK
15 minute winter	S34	10	52.361	0.081	16.1	0.1157	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	S2	1.000	S4	11.7	0.608	0.163	0.2563	
15 minute winter	S4	1.001	S6	17.2	0.747	0.229	0.3491	
15 minute winter	S6	1.002	S8	18.2	0.681	0.247	0.2786	
15 minute winter	S8	1.003	S16	27.7	0.960	0.385	1.9300	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	3.9	0.858	0.581	0.0318	
15 minute winter	SW-IC6	Lateral 2	S10	3.9	0.792	0.217	0.0393	
15 minute winter	S10	2.000	S12	9.5	0.702	0.133	0.4344	
15 minute winter	S12	2.001	S14	29.7	0.931	0.208	0.4585	
15 minute winter	S14	2.002	S16	36.8	1.008	0.209	0.7833	
15 minute winter	S16	1.004	S26	83.8	1.681	0.339	1.7784	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	2.8	0.834	0.396	0.0493	
15 minute winter	SW-IC2	Lateral 4	S18	7.0	0.957	0.380	0.1216	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	1.9	0.762	0.252	0.0164	
15 minute winter	SW-IC4	Lateral 5	S18	6.6	1.236	0.240	0.0632	
15 minute winter	S18	3.000	S24	22.2	0.606	0.194	3.1989	
15 minute winter	S20	4.000	S22	26.3	1.326	0.116	0.7980	
15 minute winter	S22	4.001	S24	44.4	1.638	0.129	0.7781	
15 minute winter	S24	3.001	S26	94.0	0.880	0.607	4.3926	
15 minute winter	S26	1.005	S28	191.4	1.030	0.857	11.0106	
15 minute summer	S28	1.006	S32	203.5	1.195	0.921	1.9741	
15 minute winter	S30	5.000	S32	16.8	0.920	0.417	0.4891	
15 minute summer	S32	1.007	HW1	223.9	1.612	1.001	2.8282	
15 minute winter	HW1	1.008	HW2	241.6	2.767	0.263	3.9135	
360 minute winter	HW2	1.009	S36 (HB)	5.7	0.119	0.016	1.7066	
15 minute winter	S34	6.000	S36 (HB)	15.8	1.269	0.259	0.3036	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S36 (HB)	336	52.065	0.421	6.2	2.9777	0.0000	OK
360 minute winter	S38	336	51.569	0.059	5.9	0.1034	0.0000	OK
360 minute winter	S40	344	51.500	0.057	5.9	0.1014	0.0000	OK
360 minute winter	S42	344	51.273	0.060	5.9	0.1069	0.0000	OK
360 minute winter	HW3	344	51.020	0.049	5.9	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)
360 minute winter	S36 (HB)	1.010	S38	5.9	0.453	0.026	0.7905	
360 minute winter	S38	1.011	S40	5.9	0.455	0.026	0.3877	
360 minute winter	S40	1.012	S42	5.9	0.443	0.026	1.3847	
360 minute winter	S42	1.013	HW3	5.9	0.493	0.026	1.3132	305.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	10	53.240	0.130	22.6	0.1859	0.0000	OK
15 minute winter	S4	10	53.210	0.156	33.2	0.2228	0.0000	OK
15 minute winter	S6	11	53.162	0.177	34.2	0.2004	0.0000	OK
15 minute winter	S8	12	53.135	0.195	54.5	0.2205	0.0000	OK
15 minute winter	SW-IC5	11	53.521	0.121	7.6	0.1733	0.0000	SURCHARGED
15 minute winter	SW-IC6	11	53.334	0.071	7.3	0.1019	0.0000	OK
15 minute winter	S10	10	53.135	0.104	17.8	0.1487	0.0000	OK
15 minute winter	S12	12	53.066	0.243	57.6	0.3474	0.0000	OK
15 minute winter	S14	12	53.048	0.298	71.0	0.3366	0.0000	OK
15 minute winter	S16	12	53.028	0.443	163.8	0.6345	0.0000	SURCHARGED
15 minute winter	SW-IC1	10	53.176	0.076	5.5	0.1092	0.0000	OK
15 minute winter	SW-IC2	11	53.080	0.230	13.3	0.3288	0.0000	SURCHARGED
15 minute winter	SW-IC3	10	53.152	0.052	3.6	0.0739	0.0000	OK
15 minute summer	SW-IC4	10	53.055	0.105	12.1	0.1505	0.0000	OK
15 minute summer	S18	10	52.984	0.538	39.2	0.9501	0.0000	SURCHARGED
15 minute summer	S20	10	53.340	0.119	48.2	0.1707	0.0000	OK
15 minute winter	S22	11	52.968	0.263	85.9	0.3765	0.0000	OK
15 minute winter	S24	11	52.948	0.774	161.7	1.1083	0.0000	SURCHARGED
15 minute winter	S26	11	52.836	0.815	316.2	1.1670	0.0000	SURCHARGED
15 minute winter	S28	11	52.550	0.650	347.6	1.1492	0.0000	SURCHARGED
15 minute summer	S30	9	52.578	0.271	30.8	0.3875	0.0000	SURCHARGED
15 minute winter	S32	8	52.463	0.583	383.0	1.0306	0.0000	SURCHARGED
15 minute winter	HW1	8	52.430	0.580	384.7	0.8296	0.0000	OK
480 minute winter	HW2	464	52.389	0.689	44.7	414.9730	0.0000	SURCHARGED
15 minute winter	S34	10	52.398	0.118	30.6	0.1682	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	S2	1.000	S4	22.3	0.674	0.310	0.4383	
15 minute winter	S4	1.001	S6	32.4	0.827	0.432	0.6019	
15 minute winter	S6	1.002	S8	34.4	0.756	0.468	0.4651	
15 minute winter	S8	1.003	S16	54.0	1.011	0.752	3.9427	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	7.3	0.934	1.076	0.0522	
15 minute winter	SW-IC6	Lateral 2	S10	7.3	0.926	0.403	0.0624	
15 minute winter	S10	2.000	S12	18.5	0.785	0.260	0.9661	
15 minute winter	S12	2.001	S14	56.8	1.095	0.399	1.2115	
15 minute winter	S14	2.002	S16	70.5	1.052	0.400	2.1634	
15 minute winter	S16	1.004	S26	152.1	1.736	0.615	3.0074	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	5.1	0.940	0.722	0.1044	
15 minute winter	SW-IC2	Lateral 4	S18	16.0	1.073	0.869	0.2913	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	3.5	0.893	0.471	0.0262	
15 minute summer	SW-IC4	Lateral 5	S18	11.5	1.403	0.421	0.1832	
15 minute summer	S18	3.000	S24	50.9	0.598	0.445	6.5717	
15 minute summer	S20	4.000	S22	47.8	1.530	0.211	1.9077	
15 minute winter	S22	4.001	S24	81.0	1.640	0.235	1.4952	
15 minute winter	S24	3.001	S26	157.6	0.995	1.018	5.3807	
15 minute winter	S26	1.005	S28	317.8	1.471	1.422	12.0501	
15 minute winter	S28	1.006	S32	348.7	1.614	1.579	2.0543	
15 minute summer	S30	5.000	S32	33.1	0.862	0.825	0.8407	
15 minute winter	S32	1.007	HW1	384.7	2.013	1.720	3.0044	
15 minute winter	HW1	1.008	HW2	389.1	3.071	0.424	4.9764	
480 minute winter	HW2	1.009	S36 (HB)	5.8	0.119	0.016	2.1305	
15 minute winter	S34	6.000	S36 (HB)	30.1	1.491	0.492	0.4919	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	S36 (HB)	464	52.389	0.745	6.6	5.2690	0.0000	SURCHARGED
60 minute winter	S38	44	51.569	0.059	5.9	0.1038	0.0000	OK
15 minute winter	S40	19	51.502	0.059	5.8	0.1040	0.0000	OK
60 minute summer	S42	140	51.274	0.061	5.9	0.1072	0.0000	OK
60 minute summer	HW3	139	51.020	0.049	5.9	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)
480 minute winter	S36 (HB)	1.010	S38	5.9	0.454	0.026	0.7945	
60 minute winter	S38	1.011	S40	5.9	0.457	0.026	0.3896	
15 minute winter	S40	1.012	S42	6.0	0.542	0.026	1.3812	
60 minute summer	S42	1.013	HW3	5.9	0.495	0.026	1.3197	315.3

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	11	54.601	1.491	42.9	2.1336	3.6516	FLOOD
15 minute winter	S4	11	54.604	1.550	56.3	2.2174	0.0000	FLOOD RISK
15 minute winter	S6	11	54.594	1.609	47.9	1.8202	0.0000	FLOOD RISK
15 minute winter	S8	11	54.587	1.647	74.2	1.8630	0.0000	SURCHARGED
15 minute winter	SW-IC5	12	54.700	1.300	14.4	1.8603	0.1224	FLOOD
15 minute winter	SW-IC6	11	54.500	1.237	21.2	1.7701	0.3608	FLOOD
15 minute winter	S10	11	54.498	1.467	29.3	2.0998	0.0000	FLOOD RISK
15 minute winter	S12	11	54.448	1.625	89.8	2.3254	0.7826	FLOOD
15 minute winter	S14	11	54.415	1.665	114.2	1.8826	0.0000	FLOOD RISK
15 minute winter	S16	11	54.332	1.747	243.7	2.5004	0.0000	FLOOD RISK
15 minute winter	SW-IC1	11	54.000	0.900	11.4	1.2879	0.8317	FLOOD
15 minute winter	SW-IC2	10	53.950	1.100	18.1	1.5741	2.6478	FLOOD
15 minute winter	SW-IC3	11	54.000	0.900	12.9	1.2879	1.0691	FLOOD
15 minute summer	SW-IC4	11	54.030	1.080	18.0	1.5452	0.0000	FLOOD RISK
15 minute winter	S18	10	53.950	1.504	66.8	2.6576	6.0959	FLOOD
15 minute winter	S20	11	54.226	1.005	95.5	1.4386	0.0000	SURCHARGED
15 minute winter	S22	11	54.123	1.418	155.9	2.0287	0.0000	FLOOD RISK
15 minute summer	S24	11	53.977	1.803	234.5	2.5800	0.0000	FLOOD RISK
15 minute winter	S26	11	53.791	1.771	488.6	2.5344	0.0000	SURCHARGED
15 minute winter	S28	11	53.092	1.192	558.1	2.1058	0.0000	SURCHARGED
15 minute winter	S30	11	53.128	0.821	61.1	1.1744	0.0000	SURCHARGED
960 minute winter	S32	930	53.037	1.157	48.5	2.0439	0.0000	SURCHARGED
960 minute winter	HW1	930	53.037	1.187	47.7	1.6991	0.0000	FLOOD RISK
960 minute winter	HW2	930	53.037	1.337	47.4	906.0804	0.0000	FLOOD RISK
960 minute winter	S34	930	53.037	0.757	3.6	1.0832	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 winter	S2	1.000	S4	37.0	0.711	0.514	0.9331	
15 minute winter	S4	1.001	S6	46.5	0.865	0.621	1.0592	
15 minute winter	S6	1.002	S8	56.2	0.798	0.764	0.7179	
15 minute winter	S8	1.003	S16	80.4	1.141	1.118	4.6711	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	13.3	1.705	1.973	0.0544	
15 minute winter	SW-IC6	Lateral 2	S10	22.8	1.293	1.262	0.1400	
15 minute winter	S10	2.000	S12	39.2	0.782	0.551	2.2704	
15 minute winter	S12	2.001	S14	93.3	1.035	0.655	1.5788	
15 minute winter	S14	2.002	S16	116.5	1.073	0.661	2.3380	
15 minute winter	S16	1.004	S26	246.4	2.234	0.997	3.0074	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	8.9	1.139	1.261	0.1148	
15 minute winter	SW-IC2	Lateral 4	S18	19.7	1.169	1.067	0.2913	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	9.3	1.190	1.259	0.0524	
15 minute summer	SW-IC4	Lateral 5	S18	22.0	1.358	0.807	0.2094	
15 minute winter	S18	3.000	S24	64.0	0.592	0.559	6.5717	
15 minute winter	S20	4.000	S22	93.2	1.565	0.411	4.4406	
15 minute winter	S22	4.001	S24	158.6	1.714	0.461	1.7098	
15 minute summer	S24	3.001	S26	233.6	1.475	1.508	5.3807	
15 minute winter	S26	1.005	S28	490.3	2.270	2.194	12.0501	
15 minute winter	S28	1.006	S32	558.9	2.588	2.531	2.0543	
15 minute winter	S30	5.000	S32	58.3	1.467	1.452	0.8407	
960 minute winter	S32	1.007	HW1	47.7	0.824	0.213	3.0044	
960 minute winter	HW1	1.008	HW2	47.4	0.998	0.052	11.9193	
960 minute winter	HW2	1.009	S36 (HB)	5.8	0.119	0.016	2.1305	
960 minute winter	S34	6.000	S36 (HB)	3.4	0.673	0.056	0.9687	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	S36 (HB)	930	53.037	1.393	6.5	9.8468	0.0000	SURCHARGED
60 minute summer	S38	36	51.569	0.059	5.9	0.1039	0.0000	OK
15 minute winter	S40	17	51.503	0.060	5.9	0.1061	0.0000	OK
15 minute summer	S42	247	51.274	0.061	6.1	0.1072	0.0000	OK
15 minute summer	HW3	246	51.020	0.049	5.9	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)
960 minute winter	S36 (HB)	1.010	S38	5.9	0.454	0.026	0.7945	
60 minute summer	S38	1.011	S40	5.9	0.458	0.026	0.3896	
15 minute winter	S40	1.012	S42	6.1	0.555	0.027	1.3917	
15 minute summer	S42	1.013	HW3	5.9	0.495	0.026	1.3197	358.7

Appendix B

(Drainage Strategy Drawing)



1:500
0 12.5m 25m

NOTES:

1. Pegasus Group does not take responsibility for the misuse of this drawing, this drawing is intended for Reserved Matters and not used for construction.
2. Do not scale this drawing. If in doubt, ask.
3. This drawing is to be read in conjunction with all other relevant Engineers, Architects and specialist design drawings and details.
4. All dimensions are in metres unless noted otherwise. All levels are in metres unless noted otherwise.
5. This drawing is for Indicative Costings Only and submission for Reserved Matters Planning Purposes and is subject to further detailed design.
6. All Finished Floor and Garage Levels are +/- 500mm subject to feasibility design for Planning.
7. Storm, Foul Water and Attenuation Pond Sizing is for Costings and Planning further detailed design may be required.
8. Demarcation manholes and lateral drains need to be constructed in accordance with the Design and Construction Guidance (DCG).
9. All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with 'the Design and Construction Guidance' and the Adopting Water Authority's recommendations
10. SIO6 application to be approved before connecting to the existing sewer.
11. Any Private drainage shown is subject to detailed design

Key

Site Boundary

Key

Existing - Foul Water Sewer

Existing - Foul Water Manhole

Existing - Foul Rising Main

Existing Sewer to be abandoned

SIB5 - Indicative Foul Rising Main Diversion

Proposed - Adoptable Foul Water Sewer

Proposed - Adoptable Surface Water Sewer

Proposed - Adoptable Foul Manhole Manhole

Proposed - Adoptable Surface Water Manhole

Sewer Easement

Indicative Private Surface Water Pipe

Indicative Private PPIC

P6	08/01/2026	Added private drainage runs shown in calculations	MW	TG	TG
P5	27/12/2025	Drainage alignment of Runs 3.000 & 4.001 amended.	AT	JG	SD
P4	25/12/2025	Hydrobrake Chamber Note Manhole removed.	AT	JG	SD
P3	21/3/2025	Revised to suit client comments	AT	JG	SD
P2	31/03/2025	Revised to suit client comments	AT	JG	SD
P1	17/10/2025	First issue	AT	JG	SD

REV	DATE	DESCRIPTION	REVISED	CHECKED	APPROVED
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Storm & Foul Water Drainage Strategy

Land at High Street Sutton Benger

CLIENT: Charles Church

DATE: 15.10.25 SCALE: 1:500 DRAWN BY: AT CHECKED BY: JG APPROVED BY: SD

DRAWING NUMBER: P25-2384-PEG-XX-XX-DR-C- 0110 -P6 BIR/IN PG OFFICE / TEAM:

PEGASUS REF No: P25-2384 DRAWING STATUS: PLANNING

PEGASUS GROUP

Appendix C

(Impermeable Area Plan)



Appendix D

(Flood Exceedance Plan)



N

1:500

0 12.5m 25m

NOTES

1.

This drawing has been produced by Pegasus Group for the client and should not be used for anything outside of its intended purpose. Pegasus Group accept no liability for the misuse of this drawing.

2.

Do not use this drawing to scale from.

3.

Drawing to be used for planning purposes only.

4.

Pegasus do not take any liability for the misuse of this drawing.

5.

All measurements are in metres unless stated otherwise.

6.

This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.

7.

All dimensions are in metres unless otherwise stated.

8.

Any potential flooding to be contained within road and picked up within road gullies. Flooding depth will not overtop HB2 kerbs

Key:

Site Boundary

Flood Exceedance Direction

Flooding manholes from storms for the 100+CC Year Event

Screen / Grill to be installed in the last manhole prior to connection into existing sewers (foul and storm) to prevent construction debris entering existing sewer network

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

P4

08.01.26

Updated for amended drainage calculations

MW

TG

TG

P3

25.10.25

Manhole References in Notes Updated

AT

JG

SD

P2

21.03.25

Client Logo Updated

AT

JG

SD

P1

31.10.25

First Issue

AT

JG

SD

REV

DATE

DESCRIPTION

REVISED

CHECKED

APPROVED

Surface Water

Flood Exceedance Plan

Land at High Street

Sutton Benger

CLIENT:

Charles Church

DATE:

15.10.25

SCALE:

1:500

DRAWN BY:

AT

CHECKED BY:

JG

APPROVED BY:

SD

DRAWING NUMBER:

P25-2384-PEG-XX-XX-DR-C- 0110 -P4

PG OFFICE / TEAM:

BIR/IN

PEGASUS REF No:

P25-2384

DRAWING STATUS:

PLANNING

PEGASUS GROUP

Appendix E

(Maximum Worst Case Water Level Surcharged Outfall
Drainage Calculations)

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	21.000	Minimum Backdrop Height (m)	0.200
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	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
S2	0.062	5.00	54.601	394936.747	178816.667	1.491
S4	0.030	5.00	54.744	394935.011	178829.804	1.690
S6	0.005	5.00	54.885	394942.014	178843.115	1.900
S8	0.058	5.00	54.893	394952.014	178845.092	1.953
SW-IC5	0.021	5.00	54.700	395018.236	178742.679	1.300
SW-IC6	0.000		54.500	395011.342	178741.767	1.237
S10	0.030	5.00	54.531	395006.009	178747.664	1.500
S12	0.110	5.00	54.448	395001.196	178779.544	1.625
S14	0.039	5.00	54.533	395000.895	178793.855	1.783
S16	0.108	5.00	54.431	395010.052	178812.972	1.846
SW-IC1	0.015	5.00	54.000	395113.793	178818.581	0.900
SW-IC2	0.023	5.00	53.950	395111.475	178833.066	1.100
SW-IC3	0.010	5.00	54.000	395101.006	178866.592	0.900
SW-IC4	0.025	5.00	54.200	395103.035	178860.205	1.250
S18	0.047	5.00	53.950	395107.073	178849.014	1.504
S20	0.139	5.00	54.796	395027.683	178878.304	1.575
S22	0.097	5.00	54.281	395039.390	178839.784	1.576
S24	0.114	5.00	54.191	395050.836	178829.330	2.017
S26	0.053	5.00	54.564	395033.959	178799.861	2.544
S28	0.105	5.00	53.904	395082.605	178772.569	2.004
S30	0.089	5.00	53.466	395092.778	178743.854	1.159
S32	0.019	5.00	53.828	395087.198	178764.243	1.948
HW1			53.208	395099.736	178770.259	1.358
HW2			53.208	395125.277	178779.264	1.508
S34	0.084	5.00	53.686	395105.553	178785.771	1.406
S36 (HB)	0.017	5.00	53.871	395129.804	178788.026	2.227
S38			53.914	395114.313	178847.155	2.404
S40			53.878	395106.261	178876.164	2.435
S42			53.726	395077.094	178976.796	2.513
HW3			52.500	395045.886	179082.495	1.529

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S2	S4	13.251	53.110	53.054	0.056	236.6	300	5.22	50.0
1.001	S4	S6	15.041	53.054	52.985	0.069	218.0	300	5.45	50.0
1.002	S6	S8	10.194	52.985	52.940	0.045	226.5	300	5.62	50.0
1.003	S8	S16	66.333	52.940	52.660	0.280	236.9	300	6.70	50.0
Private 2.0	SW-IC5	SW-IC6	6.954	53.400	53.313	0.087	80.0	100	5.13	50.0
Lateral 2	SW-IC6	S10	7.951	53.263	53.181	0.082	97.0	150	5.26	50.0
2.000	S10	S12	32.241	53.031	52.898	0.133	242.4	300	5.80	50.0
2.001	S12	S14	14.314	52.823	52.750	0.073	196.1	375	5.98	50.0
2.002	S14	S16	21.197	52.750	52.585	0.165	128.5	375	6.21	50.0
1.004	S16	S26	27.266	52.585	52.170	0.415	65.7	375	6.91	50.0
Private 4.0	SW-IC1	SW-IC2	14.669	53.100	52.900	0.200	73.3	100	5.27	50.0
Lateral 4	SW-IC2	S18	16.544	52.850	52.671	0.179	92.4	150	5.54	50.0
Private 5.0	SW-IC3	SW-IC4	6.702	53.100	53.000	0.100	67.0	100	5.12	50.0
Lateral 5	SW-IC4	S18	11.897	52.950	52.671	0.279	42.6	150	5.25	50.0
3.000	S18	S24	59.582	52.446	52.249	0.197	302.4	375	6.49	50.0
4.000	S20	S22	40.260	53.221	52.705	0.516	78.0	375	5.33	50.0
4.001	S22	S24	15.502	52.705	52.249	0.456	34.0	375	5.41	50.0
3.001	S24	S26	33.960	52.174	52.095	0.079	429.9	450	7.07	50.0
1.005	S26	S28	55.779	52.020	51.900	0.120	464.8	525	7.98	50.0
1.006	S28	S32	9.509	51.900	51.880	0.020	475.4	525	8.13	50.0
5.000	S30	S32	21.139	52.307	52.180	0.127	166.4	225	5.35	50.0
1.007	S32	HW1	13.907	51.880	51.850	0.030	463.6	525	8.36	50.0
1.008	HW1	HW2	27.082	51.850	51.700	0.150	180.5	750	8.57	50.0
1.009	HW2	S36 (HB)	9.862	51.700	51.644	0.056	176.1	525	8.67	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	1.018	71.9	8.4	1.191	1.390	0.062	0.0	69	0.686
1.001	1.061	75.0	12.5	1.390	1.600	0.092	0.0	82	0.791
1.002	1.040	73.5	13.1	1.600	1.653	0.097	0.0	85	0.791
1.003	1.017	71.9	21.0	1.653	1.471	0.155	0.0	111	0.887
Private 2.0	0.861	6.8	2.8	1.200	1.087	0.021	0.0	45	0.821
Lateral 2	1.020	18.0	2.8	1.087	1.200	0.021	0.0	40	0.745
2.000	1.005	71.1	6.9	1.200	1.250	0.051	0.0	63	0.644
2.001	1.290	142.5	21.8	1.250	1.408	0.161	0.0	99	0.942
2.002	1.597	176.4	27.1	1.408	1.471	0.200	0.0	99	1.166
1.004	2.238	247.2	62.7	1.471	2.019	0.463	0.0	129	1.882
Private 4.0	0.900	7.1	2.0	0.800	0.950	0.015	0.0	37	0.782
Lateral 4	1.046	18.5	5.1	0.950	1.129	0.038	0.0	54	0.898
Private 5.0	0.942	7.4	1.4	0.800	1.100	0.010	0.0	29	0.720
Lateral 5	1.546	27.3	4.7	1.100	1.129	0.035	0.0	42	1.167
3.000	1.036	114.5	16.3	1.129	1.567	0.120	0.0	95	0.740
4.000	2.053	226.7	18.8	1.200	1.201	0.139	0.0	72	1.258
4.001	3.116	344.2	32.0	1.201	1.567	0.236	0.0	77	1.979
3.001	0.974	154.9	63.7	1.567	2.019	0.470	0.0	201	0.928
1.005	1.032	223.4	133.6	2.019	1.479	0.986	0.0	293	1.076
1.006	1.020	220.9	147.9	1.479	1.423	1.091	0.0	315	1.090
5.000	1.010	40.2	12.1	0.934	1.423	0.089	0.0	84	0.884
1.007	1.033	223.7	162.5	1.423	0.833	1.199	0.0	333	1.123
1.008	2.079	918.6	162.5	0.608	0.758	1.199	0.0	211	1.586
1.009	1.684	364.6	162.5	0.983	1.702	1.199	0.0	245	1.638

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
6.000	S34	S36 (HB)	24.356	52.280	51.944	0.336	72.5	225	5.26	50.0
1.010	S36 (HB)	S38	61.125	51.644	51.510	0.134	456.2	525	9.65	50.0
1.011	S38	S40	30.106	51.510	51.443	0.067	449.3	525	10.13	50.0
1.012	S40	S42	104.774	51.443	51.213	0.230	455.5	525	11.80	48.3
1.013	S42	HW3	110.210	51.213	50.971	0.242	455.4	525	13.56	44.7

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)
6.000	1.538	61.1	11.4	1.181	1.702	0.084	0.0	65	1.182
1.010	1.042	225.6	176.2	1.702	1.879	1.300	0.0	350	1.147
1.011	1.050	227.3	176.2	1.879	1.910	1.300	0.0	348	1.154
1.012	1.043	225.7	170.3	1.910	1.988	1.300	0.0	342	1.141
1.013	1.043	225.7	157.4	1.988	1.004	1.300	0.0	324	1.124

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	10000
M5-60 (mm)	21.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	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 %)
100	45	0	0

Node HW3 Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.569	1440	1.569

Node S36 (HB) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	51.644	Product Number	CTL-SHE-0107-5900-1500-5900
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.9	Min Node Diameter (mm)	1200

Node HW2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.00000

Safety Factor 2.0

Invert Level (m) 51.700

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)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	525.8	0.0	0.500	634.6	0.0	1.000	753.0	0.0	1.500	880.5	0.0
0.100	546.5	0.0	0.600	657.6	0.0	1.100	777.8	0.0	1.508	882.6	0.0
0.200	568.0	0.0	0.700	680.9	0.0	1.200	802.9	0.0			
0.300	589.8	0.0	0.800	704.6	0.0	1.300	828.4	0.0			
0.400	612.1	0.0	0.900	728.6	0.0	1.400	854.3	0.0			

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 95.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	11	54.601	1.491	42.9	2.1336	3.6516	FLOOD
15 minute winter	S4	11	54.604	1.550	56.3	2.2174	0.0000	FLOOD RISK
15 minute winter	S6	11	54.594	1.609	47.9	1.8202	0.0000	FLOOD RISK
15 minute winter	S8	11	54.587	1.647	74.2	1.8630	0.0000	SURCHARGED
15 minute winter	SW-IC5	12	54.700	1.300	14.4	1.8603	0.1224	FLOOD
15 minute winter	SW-IC6	11	54.500	1.237	21.2	1.7701	0.3608	FLOOD
15 minute winter	S10	11	54.498	1.467	29.3	2.0998	0.0000	FLOOD RISK
15 minute winter	S12	11	54.448	1.625	89.8	2.3254	0.7826	FLOOD
15 minute winter	S14	11	54.415	1.665	114.2	1.8826	0.0000	FLOOD RISK
15 minute winter	S16	11	54.332	1.747	243.7	2.5004	0.0000	FLOOD RISK
15 minute winter	SW-IC1	11	54.000	0.900	11.4	1.2879	0.8317	FLOOD
15 minute winter	SW-IC2	10	53.950	1.100	18.1	1.5741	2.6478	FLOOD
15 minute winter	SW-IC3	11	54.000	0.900	12.9	1.2879	1.0691	FLOOD
15 minute summer	SW-IC4	11	54.030	1.080	18.0	1.5452	0.0000	FLOOD RISK
15 minute winter	S18	10	53.950	1.504	66.8	2.6576	6.0959	FLOOD
15 minute winter	S20	11	54.226	1.005	95.5	1.4386	0.0000	SURCHARGED
15 minute winter	S22	11	54.123	1.418	155.9	2.0287	0.0000	FLOOD RISK
15 minute summer	S24	11	53.977	1.803	234.5	2.5800	0.0000	FLOOD RISK
15 minute winter	S26	11	53.791	1.771	488.6	2.5344	0.0000	SURCHARGED
1440 minute winter	S28	1380	53.120	1.219	32.3	2.1548	0.0000	SURCHARGED
15 minute winter	S30	11	53.128	0.821	61.1	1.1744	0.0000	SURCHARGED
1440 minute winter	S32	1380	53.119	1.239	35.4	2.1890	0.0000	SURCHARGED
1440 minute winter	HW1	1380	53.120	1.270	35.2	1.8168	0.0000	FLOOD RISK
1440 minute winter	HW2	1380	53.119	1.419	36.6	975.7851	0.0000	FLOOD RISK
1440 minute winter	S34	1380	53.119	0.839	2.6	1.2006	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 winter	S2	1.000	S4	37.0	0.711	0.514	0.9331	
15 minute winter	S4	1.001	S6	46.5	0.865	0.621	1.0592	
15 minute winter	S6	1.002	S8	56.2	0.798	0.764	0.7179	
15 minute winter	S8	1.003	S16	80.4	1.141	1.118	4.6711	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	13.3	1.705	1.973	0.0544	
15 minute winter	SW-IC6	Lateral 2	S10	22.8	1.293	1.262	0.1400	
15 minute winter	S10	2.000	S12	39.2	0.782	0.551	2.2704	
15 minute winter	S12	2.001	S14	93.3	1.035	0.655	1.5788	
15 minute winter	S14	2.002	S16	116.5	1.073	0.661	2.3380	
15 minute winter	S16	1.004	S26	246.4	2.234	0.997	3.0074	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	8.9	1.139	1.261	0.1148	
15 minute winter	SW-IC2	Lateral 4	S18	19.7	1.169	1.067	0.2913	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	9.3	1.190	1.259	0.0524	
15 minute summer	SW-IC4	Lateral 5	S18	22.0	1.358	0.807	0.2094	
15 minute winter	S18	3.000	S24	64.0	0.592	0.559	6.5717	
15 minute winter	S20	4.000	S22	93.2	1.565	0.411	4.4406	
15 minute winter	S22	4.001	S24	158.6	1.714	0.461	1.7098	
15 minute summer	S24	3.001	S26	233.6	1.475	1.508	5.3807	
15 minute winter	S26	1.005	S28	490.3	2.270	2.194	12.0501	
1440 minute winter	S28	1.006	S32	32.2	0.502	0.146	2.0543	
15 minute winter	S30	5.000	S32	58.3	1.467	1.452	0.8407	
1440 minute winter	S32	1.007	HW1	35.2	0.702	0.157	3.0044	
1440 minute winter	HW1	1.008	HW2	35.4	0.886	0.039	11.9193	
1440 minute winter	HW2	1.009	S36 (HB)	5.9	0.089	0.016	2.1305	
1440 minute winter	S34	6.000	S36 (HB)	2.5	0.575	0.041	0.9687	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 95.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	S36 (HB)	1380	53.119	1.475	6.1	10.4265	0.0000	SURCHARGED
240 minute summer	S38	232	52.560	1.050	6.0	1.8562	0.0000	SURCHARGED
240 minute summer	S40	232	52.559	1.116	6.6	1.9713	0.0000	SURCHARGED
240 minute summer	S42	232	52.549	1.336	7.3	2.3606	0.0000	SURCHARGED
15 minute summer	HW3	1	52.540	1.569	0.0	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)
1440 minute winter	S36 (HB)	1.010	S38	5.9	0.380	0.026	13.2050	
240 minute summer	S38	1.011	S40	6.6	0.442	0.029	6.5039	
240 minute summer	S40	1.012	S42	7.3	0.416	0.032	22.6346	
240 minute summer	S42	1.013	HW3	7.6	0.035	0.034	23.8090	187.1

Appendix F

(Worst Case Water Level in Previous Surveys Surcharged
Outfall Drainage Calculations)

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	21.000	Minimum Backdrop Height (m)	0.200
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	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
S2	0.062	5.00	54.601	394936.747	178816.667	1.491
S4	0.030	5.00	54.744	394935.011	178829.804	1.690
S6	0.005	5.00	54.885	394942.014	178843.115	1.900
S8	0.058	5.00	54.893	394952.014	178845.092	1.953
SW-IC5	0.021	5.00	54.700	395018.236	178742.679	1.300
SW-IC6	0.000		54.500	395011.342	178741.767	1.237
S10	0.030	5.00	54.531	395006.009	178747.664	1.500
S12	0.110	5.00	54.448	395001.196	178779.544	1.625
S14	0.039	5.00	54.533	395000.895	178793.855	1.783
S16	0.108	5.00	54.431	395010.052	178812.972	1.846
SW-IC1	0.015	5.00	54.000	395113.793	178818.581	0.900
SW-IC2	0.023	5.00	53.950	395111.475	178833.066	1.100
SW-IC3	0.010	5.00	54.000	395101.006	178866.592	0.900
SW-IC4	0.025	5.00	54.200	395103.035	178860.205	1.250
S18	0.047	5.00	53.950	395107.073	178849.014	1.504
S20	0.139	5.00	54.796	395027.683	178878.304	1.575
S22	0.097	5.00	54.281	395039.390	178839.784	1.576
S24	0.114	5.00	54.191	395050.836	178829.330	2.017
S26	0.053	5.00	54.564	395033.959	178799.861	2.544
S28	0.105	5.00	53.904	395082.605	178772.569	2.004
S30	0.089	5.00	53.466	395092.778	178743.854	1.159
S32	0.019	5.00	53.828	395087.198	178764.243	1.948
HW1			53.208	395099.736	178770.259	1.358
HW2			53.208	395125.277	178779.264	1.508
S34	0.084	5.00	53.686	395105.553	178785.771	1.406
S36 (HB)	0.017	5.00	53.871	395129.804	178788.026	2.227
S38			53.914	395114.313	178847.155	2.404
S40			53.878	395106.261	178876.164	2.435
S42			53.726	395077.094	178976.796	2.513
HW3			52.500	395045.886	179082.495	1.529

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S2	S4	13.251	53.110	53.054	0.056	236.6	300	5.22	50.0
1.001	S4	S6	15.041	53.054	52.985	0.069	218.0	300	5.45	50.0
1.002	S6	S8	10.194	52.985	52.940	0.045	226.5	300	5.62	50.0
1.003	S8	S16	66.333	52.940	52.660	0.280	236.9	300	6.70	50.0
Private 2.0	SW-IC5	SW-IC6	6.954	53.400	53.313	0.087	80.0	100	5.13	50.0
Lateral 2	SW-IC6	S10	7.951	53.263	53.181	0.082	97.0	150	5.26	50.0
2.000	S10	S12	32.241	53.031	52.898	0.133	242.4	300	5.80	50.0
2.001	S12	S14	14.314	52.823	52.750	0.073	196.1	375	5.98	50.0
2.002	S14	S16	21.197	52.750	52.585	0.165	128.5	375	6.21	50.0
1.004	S16	S26	27.266	52.585	52.170	0.415	65.7	375	6.91	50.0
Private 4.0	SW-IC1	SW-IC2	14.669	53.100	52.900	0.200	73.3	100	5.27	50.0
Lateral 4	SW-IC2	S18	16.544	52.850	52.671	0.179	92.4	150	5.54	50.0
Private 5.0	SW-IC3	SW-IC4	6.702	53.100	53.000	0.100	67.0	100	5.12	50.0
Lateral 5	SW-IC4	S18	11.897	52.950	52.671	0.279	42.6	150	5.25	50.0
3.000	S18	S24	59.582	52.446	52.249	0.197	302.4	375	6.49	50.0
4.000	S20	S22	40.260	53.221	52.705	0.516	78.0	375	5.33	50.0
4.001	S22	S24	15.502	52.705	52.249	0.456	34.0	375	5.41	50.0
3.001	S24	S26	33.960	52.174	52.095	0.079	429.9	450	7.07	50.0
1.005	S26	S28	55.779	52.020	51.900	0.120	464.8	525	7.98	50.0
1.006	S28	S32	9.509	51.900	51.880	0.020	475.4	525	8.13	50.0
5.000	S30	S32	21.139	52.307	52.180	0.127	166.4	225	5.35	50.0
1.007	S32	HW1	13.907	51.880	51.850	0.030	463.6	525	8.36	50.0
1.008	HW1	HW2	27.082	51.850	51.700	0.150	180.5	750	8.57	50.0
1.009	HW2	S36 (HB)	9.862	51.700	51.644	0.056	176.1	525	8.67	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	1.018	71.9	8.4	1.191	1.390	0.062	0.0	69	0.686
1.001	1.061	75.0	12.5	1.390	1.600	0.092	0.0	82	0.791
1.002	1.040	73.5	13.1	1.600	1.653	0.097	0.0	85	0.791
1.003	1.017	71.9	21.0	1.653	1.471	0.155	0.0	111	0.887
Private 2.0	0.861	6.8	2.8	1.200	1.087	0.021	0.0	45	0.821
Lateral 2	1.020	18.0	2.8	1.087	1.200	0.021	0.0	40	0.745
2.000	1.005	71.1	6.9	1.200	1.250	0.051	0.0	63	0.644
2.001	1.290	142.5	21.8	1.250	1.408	0.161	0.0	99	0.942
2.002	1.597	176.4	27.1	1.408	1.471	0.200	0.0	99	1.166
1.004	2.238	247.2	62.7	1.471	2.019	0.463	0.0	129	1.882
Private 4.0	0.900	7.1	2.0	0.800	0.950	0.015	0.0	37	0.782
Lateral 4	1.046	18.5	5.1	0.950	1.129	0.038	0.0	54	0.898
Private 5.0	0.942	7.4	1.4	0.800	1.100	0.010	0.0	29	0.720
Lateral 5	1.546	27.3	4.7	1.100	1.129	0.035	0.0	42	1.167
3.000	1.036	114.5	16.3	1.129	1.567	0.120	0.0	95	0.740
4.000	2.053	226.7	18.8	1.200	1.201	0.139	0.0	72	1.258
4.001	3.116	344.2	32.0	1.201	1.567	0.236	0.0	77	1.979
3.001	0.974	154.9	63.7	1.567	2.019	0.470	0.0	201	0.928
1.005	1.032	223.4	133.6	2.019	1.479	0.986	0.0	293	1.076
1.006	1.020	220.9	147.9	1.479	1.423	1.091	0.0	315	1.090
5.000	1.010	40.2	12.1	0.934	1.423	0.089	0.0	84	0.884
1.007	1.033	223.7	162.5	1.423	0.833	1.199	0.0	333	1.123
1.008	2.079	918.6	162.5	0.608	0.758	1.199	0.0	211	1.586
1.009	1.684	364.6	162.5	0.983	1.702	1.199	0.0	245	1.638

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
6.000	S34	S36 (HB)	24.356	52.280	51.944	0.336	72.5	225	5.26	50.0
1.010	S36 (HB)	S38	61.125	51.644	51.510	0.134	456.2	525	9.65	50.0
1.011	S38	S40	30.106	51.510	51.443	0.067	449.3	525	10.13	50.0
1.012	S40	S42	104.774	51.443	51.213	0.230	455.5	525	11.80	48.3
1.013	S42	HW3	110.210	51.213	50.971	0.242	455.4	525	13.56	44.7

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)
6.000	1.538	61.1	11.4	1.181	1.702	0.084	0.0	65	1.182
1.010	1.042	225.6	176.2	1.702	1.879	1.300	0.0	350	1.147
1.011	1.050	227.3	176.2	1.879	1.910	1.300	0.0	348	1.154
1.012	1.043	225.7	170.3	1.910	1.988	1.300	0.0	342	1.141
1.013	1.043	225.7	157.4	1.988	1.004	1.300	0.0	324	1.124

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	10000
M5-60 (mm)	21.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	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 %)
2	0	0	0
30	0	0	0
100	45	0	0

Node HW3 Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.569	1440	1.569

Node S36 (HB) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	51.644	Product Number	CTL-SHE-0107-5900-1500-5900
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.9	Min Node Diameter (mm)	1200

Node HW2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.00000

Safety Factor 2.0

Invert Level (m) 51.700

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)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	525.8	0.0	0.500	634.6	0.0	1.000	753.0	0.0	1.500	880.5	0.0
0.100	546.5	0.0	0.600	657.6	0.0	1.100	777.8	0.0	1.508	882.6	0.0
0.200	568.0	0.0	0.700	680.9	0.0	1.200	802.9	0.0			
0.300	589.8	0.0	0.800	704.6	0.0	1.300	828.4	0.0			
0.400	612.1	0.0	0.900	728.6	0.0	1.400	854.3	0.0			

Results for 2 year Critical Storm Duration. Lowest mass balance: 95.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	10	53.197	0.087	11.9	0.1241	0.0000	OK
15 minute winter	S4	10	53.159	0.105	17.5	0.1496	0.0000	OK
15 minute winter	S6	11	53.100	0.115	18.2	0.1303	0.0000	OK
15 minute winter	S8	11	53.072	0.132	28.8	0.1489	0.0000	OK
15 minute winter	SW-IC5	10	53.459	0.059	4.0	0.0840	0.0000	OK
15 minute winter	SW-IC6	11	53.313	0.050	3.9	0.0714	0.0000	OK
15 minute winter	S10	11	53.106	0.075	9.6	0.1073	0.0000	OK
15 minute winter	S12	10	52.949	0.126	30.0	0.1800	0.0000	OK
15 minute winter	S14	10	52.874	0.124	37.2	0.1400	0.0000	OK
15 minute winter	S16	11	52.738	0.153	84.0	0.2196	0.0000	OK
15 minute winter	SW-IC1	10	53.145	0.045	2.9	0.0646	0.0000	OK
15 minute winter	SW-IC2	10	52.917	0.067	7.2	0.0955	0.0000	OK
15 minute winter	SW-IC3	10	53.136	0.036	1.9	0.0513	0.0000	OK
15 minute winter	SW-IC4	10	53.002	0.052	6.7	0.0750	0.0000	OK
15 minute winter	S18	11	52.556	0.110	22.6	0.1945	0.0000	OK
15 minute winter	S20	10	53.308	0.087	26.6	0.1246	0.0000	OK
15 minute winter	S22	10	52.795	0.090	44.9	0.1289	0.0000	OK
15 minute winter	S24	11	52.506	0.332	87.7	0.4749	0.0000	OK
15 minute winter	S26	10	52.454	0.434	187.4	0.6217	0.0000	OK
15 minute summer	S28	10	52.385	0.485	198.4	0.8564	0.0000	OK
15 minute winter	S30	11	52.411	0.104	17.1	0.1486	0.0000	OK
15 minute summer	S32	10	52.359	0.479	220.0	0.8470	0.0000	OK
15 minute winter	HW1	9	52.316	0.466	236.3	0.6673	0.0000	OK
1440 minute winter	HW2	7560	52.274	0.574	11.3	338.1991	0.0000	SURCHARGED
15 minute winter	S34	10	52.361	0.081	16.1	0.1157	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	S2	1.000	S4	11.7	0.608	0.163	0.2563	
15 minute winter	S4	1.001	S6	17.2	0.747	0.229	0.3491	
15 minute winter	S6	1.002	S8	18.2	0.681	0.247	0.2786	
15 minute winter	S8	1.003	S16	27.7	0.960	0.385	1.9300	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	3.9	0.858	0.581	0.0318	
15 minute winter	SW-IC6	Lateral 2	S10	3.9	0.792	0.217	0.0393	
15 minute winter	S10	2.000	S12	9.5	0.702	0.133	0.4344	
15 minute winter	S12	2.001	S14	29.7	0.931	0.208	0.4585	
15 minute winter	S14	2.002	S16	36.8	1.008	0.209	0.7833	
15 minute winter	S16	1.004	S26	83.8	1.681	0.339	1.7784	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	2.8	0.834	0.396	0.0493	
15 minute winter	SW-IC2	Lateral 4	S18	7.0	0.957	0.380	0.1216	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	1.9	0.762	0.251	0.0164	
15 minute winter	SW-IC4	Lateral 5	S18	6.6	1.236	0.240	0.0632	
15 minute winter	S18	3.000	S24	22.2	0.606	0.194	3.1989	
15 minute winter	S20	4.000	S22	26.3	1.326	0.116	0.7980	
15 minute winter	S22	4.001	S24	44.4	1.638	0.129	0.7781	
15 minute winter	S24	3.001	S26	94.0	0.880	0.607	4.3926	
15 minute winter	S26	1.005	S28	191.4	1.030	0.857	11.0106	
15 minute summer	S28	1.006	S32	203.5	1.195	0.921	1.9741	
15 minute winter	S30	5.000	S32	16.8	0.920	0.417	0.4891	
15 minute summer	S32	1.007	HW1	223.9	1.612	1.001	2.8282	
15 minute winter	HW1	1.008	HW2	241.6	2.767	0.263	3.9135	
1440 minute winter	HW2	1.009	S36 (HB)	2.2	0.112	0.006	2.1305	
15 minute winter	S34	6.000	S36 (HB)	15.8	1.269	0.259	0.3036	

Results for 2 year Critical Storm Duration. Lowest mass balance: 95.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	S36 (HB)	7290	52.274	0.630	2.7	4.4551	0.0000	SURCHARGED
1440 minute winter	S38	8250	52.274	0.764	2.5	1.3507	0.0000	SURCHARGED
1440 minute winter	S40	2700	52.274	0.831	1.9	1.4689	0.0000	SURCHARGED
1440 minute winter	S42	8280	52.274	1.061	1.5	1.8756	0.0000	SURCHARGED
15 minute summer	HW3	1	52.540	1.569	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
1440 minute winter	S36 (HB)	1.010	S38	2.5	0.315	0.011	13.2050	
1440 minute winter	S38	1.011	S40	1.9	0.304	0.009	6.5039	
1440 minute winter	S40	1.012	S42	1.5	0.165	0.007	22.6346	
1440 minute winter	S42	1.013	HW3	0.0	0.000	0.000	23.8090	0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 95.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	10	53.240	0.130	22.6	0.1859	0.0000	OK
15 minute winter	S4	10	53.210	0.156	33.2	0.2228	0.0000	OK
15 minute winter	S6	11	53.162	0.177	34.2	0.2004	0.0000	OK
15 minute winter	S8	12	53.135	0.195	54.5	0.2205	0.0000	OK
15 minute winter	SW-IC5	11	53.521	0.121	7.6	0.1733	0.0000	SURCHARGED
15 minute winter	SW-IC6	11	53.334	0.071	7.3	0.1019	0.0000	OK
15 minute winter	S10	10	53.135	0.104	17.8	0.1487	0.0000	OK
15 minute winter	S12	12	53.066	0.243	57.6	0.3474	0.0000	OK
15 minute winter	S14	12	53.048	0.298	71.0	0.3366	0.0000	OK
15 minute winter	S16	12	53.028	0.443	163.8	0.6345	0.0000	SURCHARGED
15 minute winter	SW-IC1	10	53.176	0.076	5.5	0.1092	0.0000	OK
15 minute winter	SW-IC2	11	53.080	0.230	13.3	0.3288	0.0000	SURCHARGED
15 minute winter	SW-IC3	10	53.152	0.052	3.6	0.0739	0.0000	OK
15 minute summer	SW-IC4	10	53.055	0.105	12.1	0.1505	0.0000	OK
15 minute summer	S18	10	52.984	0.538	39.2	0.9501	0.0000	SURCHARGED
15 minute summer	S20	10	53.340	0.119	48.2	0.1707	0.0000	OK
15 minute winter	S22	11	52.968	0.263	85.9	0.3765	0.0000	OK
15 minute winter	S24	11	52.948	0.774	161.7	1.1083	0.0000	SURCHARGED
15 minute winter	S26	11	52.836	0.815	316.2	1.1670	0.0000	SURCHARGED
1440 minute winter	S28	1380	52.621	0.721	17.4	1.2747	0.0000	SURCHARGED
1440 minute winter	S30	1380	52.622	0.315	1.5	0.4509	0.0000	SURCHARGED
1440 minute winter	S32	1590	52.623	0.743	40.0	1.3126	0.0000	SURCHARGED
1440 minute winter	HW1	1380	52.621	0.771	18.5	1.1039	0.0000	SURCHARGED
1440 minute winter	HW2	1380	52.622	0.922	19.2	579.5047	0.0000	SURCHARGED
1440 minute winter	S34	1380	52.622	0.342	1.4	0.4893	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 winter	S2	1.000	S4	22.3	0.674	0.310	0.4383	
15 minute winter	S4	1.001	S6	32.4	0.827	0.432	0.6019	
15 minute winter	S6	1.002	S8	34.4	0.756	0.468	0.4651	
15 minute winter	S8	1.003	S16	54.0	1.011	0.752	3.9427	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	7.3	0.934	1.076	0.0522	
15 minute winter	SW-IC6	Lateral 2	S10	7.3	0.926	0.403	0.0624	
15 minute winter	S10	2.000	S12	18.5	0.785	0.260	0.9661	
15 minute winter	S12	2.001	S14	56.8	1.095	0.399	1.2115	
15 minute winter	S14	2.002	S16	70.5	1.052	0.400	2.1634	
15 minute winter	S16	1.004	S26	152.1	1.736	0.615	3.0074	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	5.1	0.940	0.722	0.1044	
15 minute winter	SW-IC2	Lateral 4	S18	16.0	1.073	0.869	0.2913	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	3.5	0.893	0.471	0.0262	
15 minute summer	SW-IC4	Lateral 5	S18	11.5	1.403	0.421	0.1832	
15 minute summer	S18	3.000	S24	50.9	0.598	0.445	6.5717	
15 minute summer	S20	4.000	S22	47.8	1.530	0.211	1.9077	
15 minute winter	S22	4.001	S24	81.0	1.640	0.235	1.4952	
15 minute winter	S24	3.001	S26	157.6	0.995	1.018	5.3807	
15 minute winter	S26	1.005	S28	317.8	1.471	1.422	12.0501	
1440 minute winter	S28	1.006	S32	23.5	0.508	0.106	2.0543	
1440 minute winter	S30	5.000	S32	1.5	0.485	0.037	0.8407	
1440 minute winter	S32	1.007	HW1	18.5	0.709	0.083	3.0044	
1440 minute winter	HW1	1.008	HW2	18.1	0.756	0.020	11.9193	
1440 minute winter	HW2	1.009	S36 (HB)	2.7	0.104	0.007	2.1305	
1440 minute winter	S34	6.000	S36 (HB)	1.4	0.557	0.023	0.9687	

Results for 30 year Critical Storm Duration. Lowest mass balance: 95.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	S36 (HB)	1380	52.622	0.978	3.0	6.9131	0.0000	SURCHARGED
1440 minute winter	S38	1350	52.540	1.030	2.9	1.8202	0.0000	SURCHARGED
1440 minute winter	S40	1350	52.540	1.097	2.8	1.9385	0.0000	SURCHARGED
720 minute winter	S42	8595	52.540	1.327	2.8	2.3449	0.0000	SURCHARGED
15 minute summer	HW3	1	52.540	1.569	0.0	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)
1440 minute winter	S36 (HB)	1.010	S38	2.9	0.344	0.013	13.2050	
1440 minute winter	S38	1.011	S40	2.8	0.334	0.012	6.5039	
1440 minute winter	S40	1.012	S42	2.8	0.226	0.013	22.6346	
720 minute winter	S42	1.013	HW3	0.0	0.000	0.000	23.8090	3.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 95.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S2	11	54.601	1.491	42.9	2.1336	3.6516	FLOOD
15 minute winter	S4	11	54.604	1.550	56.3	2.2174	0.0000	FLOOD RISK
15 minute winter	S6	11	54.594	1.609	47.9	1.8202	0.0000	FLOOD RISK
15 minute winter	S8	11	54.587	1.647	74.2	1.8630	0.0000	SURCHARGED
15 minute winter	SW-IC5	12	54.700	1.300	14.4	1.8603	0.1224	FLOOD
15 minute winter	SW-IC6	11	54.500	1.237	21.2	1.7701	0.3608	FLOOD
15 minute winter	S10	11	54.498	1.467	29.3	2.0998	0.0000	FLOOD RISK
15 minute winter	S12	11	54.448	1.625	89.8	2.3254	0.7826	FLOOD
15 minute winter	S14	11	54.415	1.665	114.2	1.8826	0.0000	FLOOD RISK
15 minute winter	S16	11	54.332	1.747	243.7	2.5004	0.0000	FLOOD RISK
15 minute winter	SW-IC1	11	54.000	0.900	11.4	1.2879	0.8317	FLOOD
15 minute winter	SW-IC2	10	53.950	1.100	18.1	1.5741	2.6478	FLOOD
15 minute winter	SW-IC3	11	54.000	0.900	12.9	1.2879	1.0691	FLOOD
15 minute summer	SW-IC4	11	54.030	1.080	18.0	1.5452	0.0000	FLOOD RISK
15 minute winter	S18	10	53.950	1.504	66.8	2.6576	6.0959	FLOOD
15 minute winter	S20	11	54.226	1.005	95.5	1.4386	0.0000	SURCHARGED
15 minute winter	S22	11	54.123	1.418	155.9	2.0287	0.0000	FLOOD RISK
15 minute summer	S24	11	53.977	1.803	234.5	2.5800	0.0000	FLOOD RISK
15 minute winter	S26	11	53.791	1.771	488.6	2.5344	0.0000	SURCHARGED
1440 minute winter	S28	1380	53.120	1.219	32.3	2.1548	0.0000	SURCHARGED
15 minute winter	S30	11	53.128	0.821	61.1	1.1744	0.0000	SURCHARGED
1440 minute winter	S32	1380	53.119	1.239	35.4	2.1890	0.0000	SURCHARGED
1440 minute winter	HW1	1380	53.120	1.270	35.2	1.8168	0.0000	FLOOD RISK
1440 minute winter	HW2	1380	53.119	1.419	36.6	975.7851	0.0000	FLOOD RISK
1440 minute winter	S34	1380	53.119	0.839	2.6	1.2006	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 winter	S2	1.000	S4	37.0	0.711	0.514	0.9331	
15 minute winter	S4	1.001	S6	46.5	0.865	0.621	1.0592	
15 minute winter	S6	1.002	S8	56.2	0.798	0.764	0.7179	
15 minute winter	S8	1.003	S16	80.4	1.141	1.118	4.6711	
15 minute winter	SW-IC5	Private 2.0	SW-IC6	13.3	1.705	1.973	0.0544	
15 minute winter	SW-IC6	Lateral 2	S10	22.8	1.293	1.262	0.1400	
15 minute winter	S10	2.000	S12	39.2	0.782	0.551	2.2704	
15 minute winter	S12	2.001	S14	93.3	1.035	0.655	1.5788	
15 minute winter	S14	2.002	S16	116.5	1.073	0.661	2.3380	
15 minute winter	S16	1.004	S26	246.4	2.234	0.997	3.0074	
15 minute winter	SW-IC1	Private 4.0	SW-IC2	8.9	1.139	1.261	0.1148	
15 minute winter	SW-IC2	Lateral 4	S18	19.7	1.169	1.067	0.2913	
15 minute winter	SW-IC3	Private 5.0	SW-IC4	9.3	1.190	1.259	0.0524	
15 minute summer	SW-IC4	Lateral 5	S18	22.0	1.358	0.807	0.2094	
15 minute winter	S18	3.000	S24	64.0	0.592	0.559	6.5717	
15 minute winter	S20	4.000	S22	93.2	1.565	0.411	4.4406	
15 minute winter	S22	4.001	S24	158.6	1.714	0.461	1.7098	
15 minute summer	S24	3.001	S26	233.6	1.475	1.508	5.3807	
15 minute winter	S26	1.005	S28	490.3	2.270	2.194	12.0501	
1440 minute winter	S28	1.006	S32	32.2	0.502	0.146	2.0543	
15 minute winter	S30	5.000	S32	58.3	1.467	1.452	0.8407	
1440 minute winter	S32	1.007	HW1	35.2	0.702	0.157	3.0044	
1440 minute winter	HW1	1.008	HW2	35.4	0.886	0.039	11.9193	
1440 minute winter	HW2	1.009	S36 (HB)	5.9	0.089	0.016	2.1305	
1440 minute winter	S34	6.000	S36 (HB)	2.5	0.575	0.041	0.9687	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 95.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	S36 (HB)	1380	53.119	1.475	6.1	10.4265	0.0000	SURCHARGED
240 minute summer	S38	232	52.560	1.050	6.0	1.8562	0.0000	SURCHARGED
240 minute summer	S40	232	52.559	1.116	6.6	1.9713	0.0000	SURCHARGED
240 minute summer	S42	232	52.549	1.336	7.3	2.3606	0.0000	SURCHARGED
15 minute summer	HW3	1	52.540	1.569	0.0	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)
1440 minute winter	S36 (HB)	1.010	S38	5.9	0.380	0.026	13.2050	
240 minute summer	S38	1.011	S40	6.6	0.442	0.029	6.5039	
240 minute summer	S40	1.012	S42	7.3	0.416	0.032	22.6346	
240 minute summer	S42	1.013	HW3	7.6	0.035	0.034	23.8090	187.1

Appendix G

(Water Sampling and Trial Pit Locations Plan)



DO NOT SCALE FROM THIS DRAWING

LEGEND

- Site boundary
- Existing public footpath
- Rising mains
- Foul Sewers
- Abandoned Sewers
- 5m buffer zone
- 10m buffer zone
- Trial pit and CBR location
- Window sample location
- Possible rising main
- Dynamic Probe Locatoin

Notes:

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C01	06.05.25	Fifth Issue	BS	HB	HB
Rev	Date	Amendment	Drawn	Chkd	Appd



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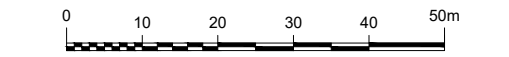
Project Name
Sutton Benger

Description
Proposed Dynamic Probe locations

Project ID	Drawing no.	Revision
315815	22201	C01

File name
315815-BL-222-XX-D-G-22201-C01

Dimensions	Scale	Size
m	1:1000	A3

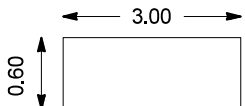


Appendix H

(Trial Pit Log – TP04)

Contract: High Street, Sutton Benger Phase 2		Client: Gladman Developments Limited		Trial Pit: TP04	
Contract Ref: 315815	Start: 04.04.25 End: 04.04.25	Ground Level (m AOD): 53.82	National Grid Co-ordinate: E:395131.5 N:178765.7	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						AGRICULTURAL TOPSOIL: Crop over brown slightly gravelly silty fine SAND. Gravel is angular fine to coarse of flint and limestone/sandstone.	53.52	(0.30)	
						Brown sandy SILT. Sand is fine	53.32	0.30	
						Yellow brown slightly sandy silty subangular to subrounded fine to coarse GRAVEL of flint, limestone, sandstone. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)		0.50	
2.00		V	c _u =98				51.82	2.00	
2.50		V	c _u =90					(1.00)	
						Stiff dark grey CLAY (KELLAWAYS FORMATION)			
							50.82	3.00	
						Terminated at 3.0mbgl due to side wall collapse			

Plan (Not to Scale)		General Remarks			
		1. Position scanned with a CAT, Genny and GPR prior to excavation. 2. Groundwater not encountered 3. Backfilled with arisings upon completion			
		All dimensions in metres		Scale: 1:25	
Method Used: Machine dug	Plant Used: 8 Ton Tracked Excavator	Logged By: Rachael Lockyer	Checked By: 		