Arun District Council
Civic Centre
Maltravers Rd
Littlehampton
BN17 5LF

Our Ref: PD/243912/03
Date: 19th September 2025
BWB Contact: David Hollingsworth
Mobile: [redacted]
Email: [redacted]

Dear Sir/Madam

PLANNING REF BE/150/22/OUT [BE/16/25/RES] – NEWLANDS ROAD, BOGNOR REGIS P022 9NN– SURFACE WATER DRAINAGE

This letter has been produced in response to the recent Lead Local Flood Authority (LLFA) objection letter dated 13th August 2025 and issued to Arun District Council as the latest consultation response on the above reserved matters submission. The LLFA have requested further information relating the location of surface flooding contained in the site during extreme rainfall events.

I am pleased to note the LLFA acknowledgement that the calculations submitted in our last note (reference PD/243912/03) has satisfied them that all flooding is removed in the 3.33% event and agreement to the modelling of the flood nodes as presented.

I note that the LLFA have two outstanding queries requiring further information, namely:

1. Whether the external flooding can be further reduced, and;
2. The LLFA have requested information to demonstrate that the building will not be flooded in the extreme rainfall events modelled (1% event adjusted by +45% for climate change) and that the surface flooding stays on site.

In answer to the first query we have further reviewed our proposals and incorporated a small amount of additional storage in pipe references 1.010 and 1.011. This has been achieved by upsizing 78m of previously 750mm diameter pipe to 1200mm diameter, introducing an additional 55m^3 of storage into the system. This change serves to eliminate the minor flooding from manhole SW50 around the site entrance and reduces the spills from other manholes in the 100 year +45% climate change storm event.

Regarding the residual flooding in that extreme event, the additional of the extra storage and a number of other SUDS features eliminates most of the flooding except that in the low lying loading docks and a small spill from a manhole on the yard access to unit 1. We have consulted with the developer of the buildings and confirmed that the extent of external flooding proposed in the loading docks and the shallow flooding of the unit 1 yard access road is acceptable to them and is within the parameters of their development specification and within the operational expectations of building

tenants. The flood protection standard of 100 year return period +45% climate change is for the building (not the external works) and this has been achieved. To apply this standard to external works is not considered commercially viable or desirable by the developer, so we are not proposing further attenuation storage.

It should be noted that the flood depths and locations set out below would not prevent the operation of the building in this extreme event as lorries in the loading docks can reverse trailors into the depth of water proposed in the dock. The lorries are then rear end load from finished floor level via the dock leveller, so no one needs to access the bottom of the loading dock and the lorry tractor is up gradient from the deepest flooding in shallower water (approx. 350mm). The flooding of parking areas does not exceed 100mm depth, so these could also remain operational in this extreme event.

In answer to the second query please find enclosed updated drawing number 243912-BWB-EXT-XX-D-C-0537 Revision P03 (SUDS Overview and Masterplan Amendments). This has been updated to show the spill locations, volumes and areas of flooding that result in the 100 year+45% event. This demonstrates that all incidental flooding from manholes is contained on site within kerb heights and dock pit arrangements at acceptable depths. It also demonstrates that this flooding would drain back down to our drainage system following the storm with no water spilling out of the site.

Flood protection to the building in the 100 year +45% event is achieved with >600mm freeboard.

I trust this demonstrates that the design operates satisfactorily in the extreme design event and enables the Lead Local Flood Authority to withdraw your objection.

Yours faithfully

[redacted]

David Hollingsworth BEng (hons) DipWEM MSc
Director

Encl:

Hydraulic Calculation Report reference 243912-BWB-EXT-XX-M-C-0500-A4-C06

BWB Drainage Layout reference 243912-BWB-EXT-XX-D-X-0500-A4-C04

BWB SUDS Overview and Masterplan Amendments 243912-BWB-EXT-XX-D-C-0537-S2-P03

Proposed Development Discharge Rate 243912-BWB-EXT-XX-G-C-0536-S2-P02

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.080	5.00	3.376	900	494258.572	101373.022	1.176
2			3.862	900	494302.395	101383.250	1.962
3	0.021	5.00	2.830	900	494330.501	101389.806	1.160
4	0.182	5.00	2.830	900	494329.938	101429.136	1.350
5			2.975	1200	494323.972	101429.136	1.545
6			3.100	1500	494306.862	101439.388	1.840
7	0.081	5.00	3.250	1500	494292.142	101448.208	2.030
8	0.201	5.00	3.479	1500	494266.340	101447.867	2.319
9	0.086	5.00	3.400	1200	494258.481	101455.349	1.600
10			3.450	1500	494251.543	101455.258	2.250
11			3.593	1800	494239.341	101447.464	2.493
12		5.00	3.620	900	494098.649	101499.328	0.620
13	0.026	5.00	3.650	900	494099.603	101435.147	1.075
14			3.675	900	494100.533	101370.907	1.600
15	0.261	5.00	3.706	1500	494103.680	101363.570	1.911
16	0.487	5.00	3.704	1500	494124.534	101363.795	2.149
17		5.00	3.418	1200	494158.962	101354.803	2.113
18	0.254	5.00	3.700	1200	494178.252	101376.460	1.775
19			3.514	1500	494182.332	101363.615	2.259
20			3.579	1500	494220.134	101375.607	2.404
J2	0.166	5.00	2.391	1200	494184.083	101432.089	0.781
22	0.330	5.00	3.000	1500	494204.085	101432.443	1.650
23			3.126	1500	494204.244	101420.970	1.856
24			3.678	1500	494204.380	101394.589	2.478
25	0.149	5.00	3.492	1200	494154.037	101349.088	1.734
26	0.066	5.00	3.519	900	494192.894	101378.147	1.069
27	0.019	5.00	3.340	1200	494197.388	101359.599	1.925
28	0.081	5.00	3.256	1200	494220.559	101365.203	1.946
29			3.235	1200	494226.507	101366.646	1.995
30	0.023	5.00	3.623	1500	494225.866	101383.980	2.503
31			3.451	1800	494233.398	101386.902	2.391
32	0.101	5.00	3.456	1800	494232.839	101447.511	2.526
33	0.060	5.00	3.456	1800	494232.393	101477.837	2.596
34	0.043	5.00	3.230	1800	494230.095	101517.661	2.450
35	0.013	5.00	3.634	900	494097.702	101564.737	1.064
36	0.140	5.00	3.699	1500	494100.770	101572.123	1.564
37	0.392	5.00	3.699	1500	494140.283	101572.672	1.849
38			3.707	1500	494173.595	101573.140	1.947
39		5.00	3.517	1500	494163.985	101582.507	2.627
40			3.499	1500	494175.985	101576.646	2.629
41	0.005	5.00	3.415	1500	494204.285	101557.358	2.615
J1	0.048	5.00	2.391	1200	494182.883	101517.961	0.786

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
43	0.177	5.00	3.000	1200	494201.716	101521.011	1.605
44			3.150	1200	494201.549	101531.374	1.835
45	0.147	5.00	3.522	900	494158.278	101587.058	1.522
46			3.275	900	494185.655	101574.790	1.785
47	0.057	5.00	3.371	1200	494200.191	101564.150	2.181
48			3.370	1200	494204.850	101560.596	2.250
49	0.022	5.00	3.348	1800	494213.587	101555.791	2.568
50	0.004	5.00	3.341	1800	494226.874	101555.916	2.641
ExMH2	0.197	5.00	2.860	1800	494226.798	101573.518	2.220
ExMH1	0.062	5.00	3.580	1200	494150.911	101606.609	1.300
ExMH3			2.680	1800	494245.463	101578.840	2.040
ExMH4	0.084	5.00	2.710	1800	494277.278	101609.015	2.200
ExMH5	0.122	5.00	2.370	1800	494340.155	101673.616	1.910
ExMH6	0.129	5.00	2.430	1800	494379.221	101715.415	2.260
Outfall			2.440		494378.469	101722.864	2.290

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S3.000	12	13	64.188	0.600	3.000	2.575	0.425	151.0	150	6.31	50.0
S3.001	13	14	64.247	0.600	2.575	2.150	0.425	151.2	150	7.63	50.0
S3.002	14	15	7.983	0.600	2.075	2.020	0.055	145.1	225	7.75	50.0
S3.003	15	16	20.855	0.600	1.795	1.705	0.090	231.7	450	8.01	50.0
S3.004	16	19	57.798	0.600	1.555	1.255	0.300	192.7	600	8.56	50.0
S4.000	17	19	24.976	0.600	1.305	1.255	0.050	499.5	600	5.38	50.0
S5.000	18	19	13.477	0.600	1.925	1.555	0.370	36.4	300	5.09	50.0
S3.005	19	20	39.659	0.600	1.255	1.175	0.080	495.7	600	9.17	50.0
S3.006	20	30	10.147	0.600	1.175	1.120	0.055	184.5	600	9.26	50.0
S6.000	25	27	44.607	0.600	1.758	1.490	0.268	166.4	225	5.74	50.0
S7.000	26	27	19.085	0.600	2.450	1.565	0.885	21.6	150	5.15	50.0
S6.001	27	28	23.839	0.600	1.415	1.310	0.105	227.0	300	6.12	50.0
S6.002	28	29	6.121	0.600	1.310	1.240	0.070	87.4	300	6.18	50.0
S6.003	29	30	17.346	0.600	1.240	1.120	0.120	144.6	300	6.40	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)
S3.000	0.815	14.4	0.0	0.470	0.925	0.000	0.0	0	0.000
S3.001	0.815	14.4	4.7	0.925	1.375	0.026	0.0	59	0.729
S3.002	1.083	43.1	4.7	1.375	1.461	0.026	0.0	50	0.712
S3.003	1.331	211.7	51.8	1.461	1.549	0.287	0.0	151	1.107
S3.004	1.751	495.0	139.8	1.549	1.659	0.774	0.0	217	1.515
S4.000	1.082	306.1	0.0	1.513	1.659	0.000	0.0	0	0.000
S5.000	2.613	184.7	46.0	1.475	1.659	0.254	0.0	102	2.183
S3.005	1.087	307.2	185.7	1.659	1.804	1.028	0.0	337	1.136
S3.006	1.789	505.9	185.7	1.804	1.903	1.028	0.0	251	1.658
S6.000	1.010	40.2	26.8	1.509	1.625	0.149	0.0	135	1.081
S7.000	2.178	38.5	11.9	0.919	1.625	0.066	0.0	57	1.923
S6.001	1.039	73.4	42.3	1.625	1.646	0.234	0.0	163	1.074
S6.002	1.682	118.9	56.9	1.646	1.695	0.315	0.0	146	1.664
S6.003	1.305	92.3	56.9	1.695	2.203	0.315	0.0	171	1.371

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S8.000A	J2	22	20.005	0.600	1.610	1.515	0.095	210.6	300	5.31	37.3
S8.000	22	23	11.400	0.600	1.350	1.270	0.080	142.5	450	5.42	50.0
S8.001	23	24	26.307	0.600	1.270	1.200	0.070	375.8	450	5.84	50.0
S8.002	24	30	23.995	0.600	1.200	1.120	0.080	299.9	450	6.18	50.0
S3.007	30	31	8.079	0.600	1.120	1.060	0.060	134.7	225	9.38	50.0
S3.008	31	32	60.612	0.600	1.060	0.930	0.130	466.2	750	10.17	50.0
S1.000	1	2	45.001	0.600	2.200	1.900	0.300	150.0	225	5.70	50.0
S1.001	2	3	28.860	0.600	1.900	1.670	0.230	125.5	225	6.12	50.0
S1.002	3	4	39.334	0.600	1.670	1.480	0.190	207.0	300	6.72	50.0
S1.003	4	5	5.966	0.600	1.480	1.430	0.050	119.3	300	6.79	50.0
S1.004	5	6	19.946	0.600	1.430	1.370	0.060	332.4	450	7.09	50.0
S1.005	6	7	17.160	0.600	1.260	1.220	0.040	429.0	600	7.33	50.0
S1.006	7	8	25.804	0.600	1.220	1.160	0.060	430.1	600	7.70	50.0
S1.007	8	11	27.002	0.600	1.160	1.100	0.060	450.0	600	8.10	50.0
S2.000	9	10	6.939	0.600	1.800	1.425	0.375	18.5	225	5.04	50.0
S2.001	10	11	14.479	0.600	1.200	1.100	0.100	144.8	450	5.18	50.0
S1.008	11	32	6.502	0.600	1.100	1.080	0.020	325.1	600	8.18	50.0
S1.009	32	33	30.329	0.600	0.930	0.860	0.070	433.3	750	10.54	50.0
S1.010	33	34	39.890	0.600	0.860	0.780	0.080	498.6	1200	10.94	50.0
S1.011	34	50	38.390	0.600	0.780	0.700	0.080	479.9	1200	11.32	50.0
S9.000	12	35	65.416	0.600	3.000	2.570	0.430	152.1	150	6.34	50.0
S9.001	35	36	8.046	0.600	2.570	2.510	0.060	134.1	150	6.50	50.0
S9.002	36	37	39.517	0.600	2.135	2.000	0.135	292.7	450	7.05	50.0
S9.003	37	38	33.315	0.600	1.850	1.760	0.090	370.2	600	7.49	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)
S8.000A	1.079	76.3	22.4	0.481	1.185	0.166	0.0	111	0.941
S8.000	1.701	270.5	89.6	1.200	1.406	0.496	0.0	178	1.534
S8.001	1.042	165.8	89.6	1.406	2.028	0.496	0.0	236	1.062
S8.002	1.168	185.8	89.6	2.028	2.053	0.496	0.0	220	1.158
S3.007	1.125	44.7	336.4	2.278	2.166	1.862	0.0	225	1.146
S3.008	1.289	569.5	336.4	1.641	1.776	1.862	0.0	416	1.340
S1.000	1.065	42.3	14.4	0.951	1.737	0.080	0.0	90	0.964
S1.001	1.166	46.3	14.4	1.737	0.935	0.080	0.0	86	1.030
S1.002	1.089	77.0	18.2	0.860	1.050	0.101	0.0	99	0.897
S1.003	1.438	101.6	51.1	1.050	1.245	0.283	0.0	150	1.439
S1.004	1.109	176.4	51.1	1.095	1.280	0.283	0.0	166	0.966
S1.005	1.169	330.5	51.1	1.240	1.430	0.283	0.0	158	0.857
S1.006	1.168	330.1	65.8	1.430	1.719	0.364	0.0	180	0.919
S1.007	1.141	322.6	102.1	1.719	1.893	0.565	0.0	231	1.017
S2.000	3.056	121.5	15.5	1.375	1.800	0.086	0.0	54	2.116
S2.001	1.687	268.3	15.5	1.800	2.043	0.086	0.0	73	0.933
S1.008	1.345	380.2	117.6	1.893	1.776	0.651	0.0	228	1.192
S1.009	1.338	591.0	472.3	1.776	1.846	2.614	0.0	509	1.477
S1.010	1.668	1886.7	483.2	1.396	1.250	2.674	0.0	412	1.410
S1.011	1.701	1923.5	491.0	1.250	1.441	2.717	0.0	410	1.435
S9.000	0.812	14.4	0.0	0.470	0.914	0.000	0.0	0	0.000
S9.001	0.866	15.3	2.4	0.914	1.039	0.013	0.0	40	0.632
S9.002	1.183	188.1	27.6	1.114	1.249	0.153	0.0	116	0.854
S9.003	1.259	356.1	98.4	1.249	1.347	0.545	0.0	215	1.084

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S9.004	38	40	4.243	0.600	1.760	0.870	0.890	4.8	600	7.50	50.0
S10.000	39	40	13.355	0.600	0.890	0.870	0.020	667.7	600	5.24	50.0
S9.005	40	41	34.248	0.600	0.870	0.800	0.070	489.3	600	8.02	50.0
S9.006	41	49	9.433	0.600	0.800	0.780	0.020	471.7	600	8.16	50.0
S12.000	45	46	30.000	0.600	2.000	1.490	0.510	58.8	225	5.29	50.0
S12.001	46	47	18.014	0.600	1.490	1.190	0.300	60.0	225	5.47	50.0
S12.002	47	48	5.860	0.600	1.190	1.120	0.070	83.7	225	5.54	50.0
S12.003	48	49	9.971	0.600	1.120	1.080	0.040	249.3	300	5.71	50.0
S11.000A	J1	43	19.078	0.600	1.605	1.470	0.135	141.3	225	5.29	37.3
S11.000	43	44	10.364	0.600	1.395	1.315	0.080	129.6	300	5.41	50.0
S11.001	44	49	27.223	0.600	1.315	1.080	0.235	115.8	300	5.73	50.0
S9.007	49	50	13.288	0.600	0.780	0.700	0.080	166.1	225	8.38	50.0
S1.012	50	ExMH2	17.602	0.600	0.700	0.640	0.060	293.4	450	11.57	50.0
Ex 1	ExMH1	ExMH2	82.788	0.600	2.280	0.670	1.610	51.4	225	5.75	36.1
Ex 2	ExMH2	ExMH3	19.409	0.600	0.670	0.640	0.030	647.0	750	11.86	24.8
Ex 3	ExMH3	ExMH4	43.849	0.600	0.640	0.510	0.130	337.3	750	12.35	23.7
Ex 4	ExMH4	ExMH5	90.103	0.600	0.510	0.460	0.050	1802.1	750	14.66	21.7
Ex 5	ExMH5	ExMH6	57.213	0.600	0.460	0.170	0.290	197.3	750	15.14	20.9
Ex 6	ExMH6	Outfall	7.487	0.600	0.170	0.150	0.020	374.4	225	15.32	21.5

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)
S9.004	11.199	3166.3	98.4	1.347	2.029	0.545	0.0	71	5.213
S10.000	0.935	264.3	0.0	2.027	2.029	0.000	0.0	0	0.000
S9.005	1.094	309.3	98.4	2.029	2.015	0.545	0.0	232	0.976
S9.006	1.114	315.1	99.4	2.015	1.968	0.550	0.0	231	0.992
S12.000	1.708	67.9	26.5	1.297	1.560	0.147	0.0	98	1.609
S12.001	1.691	67.2	26.5	1.560	1.956	0.147	0.0	98	1.592
S12.002	1.430	56.9	36.9	1.956	2.025	0.204	0.0	132	1.519
S12.003	0.991	70.1	36.9	1.950	1.968	0.204	0.0	155	1.004
S11.000A	1.098	43.6	6.5	0.561	1.305	0.048	0.0	58	0.792
S11.000	1.380	97.5	40.7	1.305	1.535	0.225	0.0	135	1.319
S11.001	1.460	103.2	40.7	1.535	1.968	0.225	0.0	131	1.377
S9.007	1.011	40.2	180.9	2.343	2.416	1.001	0.0	225	1.030
S1.012	1.182	187.9	672.6	2.191	1.770	3.722	0.0	450	1.197
Ex 1	1.828	72.7	8.1	1.075	1.965	0.062	0.0	51	1.216
Ex 2	1.092	482.6	356.9	1.440	1.290	3.982	0.0	482	1.190
Ex 3	1.518	670.5	341.0	1.290	1.450	3.982	0.0	379	1.524
Ex 4	0.650	287.1	318.9	1.450	1.160	4.066	0.0	750	0.656
Ex 5	1.988	878.5	316.3	1.160	1.510	4.187	0.0	310	1.834
Ex 6	0.670	26.6	335.4	2.035	2.065	4.317	0.0	225	0.682

Pipeline Schedule

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)
64.188	151.0	150	Circular	3.620	3.000	0.470	3.650	2.575	0.925
64.247	151.2	150	Circular	3.650	2.575	0.925	3.675	2.150	1.375
7.983	145.1	225	Circular	3.675	2.075	1.375	3.706	2.020	1.461
20.855	231.7	450	Circular	3.706	1.795	1.461	3.704	1.705	1.549
57.798	192.7	600	Circular	3.704	1.555	1.549	3.514	1.255	1.659
24.976	499.5	600	Circular	3.418	1.305	1.513	3.514	1.255	1.659
13.477	36.4	300	Circular	3.700	1.925	1.475	3.514	1.555	1.659
39.659	495.7	600	Circular	3.514	1.255	1.659	3.579	1.175	1.804
10.147	184.5	600	Circular	3.579	1.175	1.804	3.623	1.120	1.903
44.607	166.4	225	Circular	3.492	1.758	1.509	3.340	1.490	1.625
19.085	21.6	150	Circular	3.519	2.450	0.919	3.340	1.565	1.625
23.839	227.0	300	Circular	3.340	1.415	1.625	3.256	1.310	1.646
6.121	87.4	300	Circular	3.256	1.310	1.646	3.235	1.240	1.695
17.346	144.6	300	Circular	3.235	1.240	1.695	3.623	1.120	2.203
20.005	210.6	300	Circular	2.391	1.610	0.481	3.000	1.515	1.185
11.400	142.5	450	Circular	3.000	1.350	1.200	3.126	1.270	1.406
26.307	375.8	450	Circular	3.126	1.270	1.406	3.678	1.200	2.028
23.995	299.9	450	Circular	3.678	1.200	2.028	3.623	1.120	2.053
8.079	134.7	225	Circular	3.623	1.120	2.278	3.451	1.060	2.166
60.612	466.2	750	Circular	3.451	1.060	1.641	3.456	0.930	1.776
45.001	150.0	225	Circular	3.376	2.200	0.951	3.862	1.900	1.737
28.860	125.5	225	Circular	3.862	1.900	1.737	2.830	1.670	0.935
39.334	207.0	300	Circular	2.830	1.670	0.860	2.830	1.480	1.050
5.966	119.3	300	Circular	2.830	1.480	1.050	2.975	1.430	1.245
19.946	332.4	450	Circular	2.975	1.430	1.095	3.100	1.370	1.280

US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
12	900	Manhole	Adoptable	13	900	Manhole	Adoptable
13	900	Manhole	Adoptable	14	900	Manhole	Adoptable
14	900	Manhole	Adoptable	15	1500	Manhole	Adoptable
15	1500	Manhole	Adoptable	16	1500	Manhole	Adoptable
16	1500	Manhole	Adoptable	19	1500	Manhole	Adoptable
17	1200	Manhole	Adoptable	19	1500	Manhole	Adoptable
18	1200	Manhole	Adoptable	19	1500	Manhole	Adoptable
19	1500	Manhole	Adoptable	20	1500	Manhole	Adoptable
20	1500	Manhole	Adoptable	30	1500	Manhole	Adoptable
25	1200	Manhole	Adoptable	27	1200	Manhole	Adoptable
26	900	Manhole	Adoptable	27	1200	Manhole	Adoptable
27	1200	Manhole	Adoptable	28	1200	Manhole	Adoptable
28	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
29	1200	Manhole	Adoptable	30	1500	Manhole	Adoptable
J2	1200	Manhole	Adoptable	22	1500	Manhole	Adoptable
22	1500	Manhole	Adoptable	23	1500	Manhole	Adoptable
23	1500	Manhole	Adoptable	24	1500	Manhole	Adoptable
24	1500	Manhole	Adoptable	30	1500	Manhole	Adoptable
30	1500	Manhole	Adoptable	31	1800	Manhole	Adoptable
31	1800	Manhole	Adoptable	32	1800	Manhole	Adoptable
1	900	Manhole	Adoptable	2	900	Manhole	Adoptable
2	900	Manhole	Adoptable	3	900	Manhole	Adoptable
3	900	Manhole	Adoptable	4	900	Manhole	Adoptable
4	900	Manhole	Adoptable	5	1200	Manhole	Adoptable
5	1200	Manhole	Adoptable	6	1500	Manhole	Adoptable

Pipeline Schedule

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)
17.160	429.0	600	Circular	3.100	1.260	1.240	3.250	1.220	1.430
25.804	430.1	600	Circular	3.250	1.220	1.430	3.479	1.160	1.719
27.002	450.0	600	Circular	3.479	1.160	1.719	3.593	1.100	1.893
6.939	18.5	225	Circular	3.400	1.800	1.375	3.450	1.425	1.800
14.479	144.8	450	Circular	3.450	1.200	1.800	3.593	1.100	2.043
6.502	325.1	600	Circular	3.593	1.100	1.893	3.456	1.080	1.776
30.329	433.3	750	Circular	3.456	0.930	1.776	3.456	0.860	1.846
39.890	498.6	1200	Circular	3.456	0.860	1.396	3.230	0.780	1.250
38.390	479.9	1200	Circular	3.230	0.780	1.250	3.341	0.700	1.441
65.416	152.1	150	Circular	3.620	3.000	0.470	3.634	2.570	0.914
8.046	134.1	150	Circular	3.634	2.570	0.914	3.699	2.510	1.039
39.517	292.7	450	Circular	3.699	2.135	1.114	3.699	2.000	1.249
33.315	370.2	600	Circular	3.699	1.850	1.249	3.707	1.760	1.347
4.243	4.8	600	Circular	3.707	1.760	1.347	3.499	0.870	2.029
13.355	667.7	600	Circular	3.517	0.890	2.027	3.499	0.870	2.029
34.248	489.3	600	Circular	3.499	0.870	2.029	3.415	0.800	2.015
9.433	471.7	600	Circular	3.415	0.800	2.015	3.348	0.780	1.968
30.000	58.8	225	Circular	3.522	2.000	1.297	3.275	1.490	1.560
18.014	60.0	225	Circular	3.275	1.490	1.560	3.371	1.190	1.956
5.860	83.7	225	Circular	3.371	1.190	1.956	3.370	1.120	2.025
9.971	249.3	300	Circular	3.370	1.120	1.950	3.348	1.080	1.968
19.078	141.3	225	Circular	2.391	1.605	0.561	3.000	1.470	1.305
10.364	129.6	300	Circular	3.000	1.395	1.305	3.150	1.315	1.535
27.223	115.8	300	Circular	3.150	1.315	1.535	3.348	1.080	1.968
13.288	166.1	225	Circular	3.348	0.780	2.343	3.341	0.700	2.416

US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
6	1500	Manhole	Adoptable	7	1500	Manhole	Adoptable
7	1500	Manhole	Adoptable	8	1500	Manhole	Adoptable
8	1500	Manhole	Adoptable	11	1800	Manhole	Adoptable
9	1200	Manhole	Adoptable	10	1500	Manhole	Adoptable
10	1500	Manhole	Adoptable	11	1800	Manhole	Adoptable
11	1800	Manhole	Adoptable	32	1800	Manhole	Adoptable
32	1800	Manhole	Adoptable	33	1800	Manhole	Adoptable
33	1800	Manhole	Adoptable	34	1800	Manhole	Adoptable
34	1800	Manhole	Adoptable	50	1800	Manhole	Adoptable
12	900	Manhole	Adoptable	35	900	Manhole	Adoptable
35	900	Manhole	Adoptable	36	1500	Manhole	Adoptable
36	1500	Manhole	Adoptable	37	1500	Manhole	Adoptable
37	1500	Manhole	Adoptable	38	1500	Manhole	Adoptable
38	1500	Manhole	Adoptable	40	1500	Manhole	Adoptable
39	1500	Manhole	Adoptable	40	1500	Manhole	Adoptable
40	1500	Manhole	Adoptable	41	1500	Manhole	Adoptable
41	1500	Manhole	Adoptable	49	1800	Manhole	Adoptable
45	900	Manhole	Adoptable	46	900	Manhole	Adoptable
46	900	Manhole	Adoptable	47	1200	Manhole	Adoptable
47	1200	Manhole	Adoptable	48	1200	Manhole	Adoptable
48	1200	Manhole	Adoptable	49	1800	Manhole	Adoptable
J1	1200	Manhole	Adoptable	43	1200	Manhole	Adoptable
43	1200	Manhole	Adoptable	44	1200	Manhole	Adoptable
44	1200	Manhole	Adoptable	49	1800	Manhole	Adoptable
49	1800	Manhole	Adoptable	50	1800	Manhole	Adoptable

Pipeline Schedule

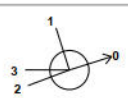
Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
17.602	293.4	450	Circular	3.341	0.700	2.191	2.860	0.640	1.770
82.788	51.4	225	Circular	3.580	2.280	1.075	2.860	0.670	1.965
19.409	647.0	750	Circular	2.860	0.670	1.440	2.680	0.640	1.290
43.849	337.3	750	Circular	2.680	0.640	1.290	2.710	0.510	1.450
90.103	1802.1	750	Circular	2.710	0.510	1.450	2.370	0.460	1.160
57.213	197.3	750	Circular	2.370	0.460	1.160	2.430	0.170	1.510
7.487	374.4	225	Circular	2.430	0.170	2.035	2.440	0.150	2.065

US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
50	1800	Manhole	Adoptable	ExMH2	1800	Manhole	Adoptable
ExMH1	1200	Manhole	Adoptable	ExMH2	1800	Manhole	Adoptable
ExMH2	1800	Manhole	Adoptable	ExMH3	1800	Manhole	Adoptable
ExMH3	1800	Manhole	Adoptable	ExMH4	1800	Manhole	Adoptable
ExMH4	1800	Manhole	Adoptable	ExMH5	1800	Manhole	Adoptable
ExMH5	1800	Manhole	Adoptable	ExMH6	1800	Manhole	Adoptable
ExMH6	1800	Manhole	Adoptable	Outfall		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	494258.572	101373.022	3.376	1.176	900				
						0	S1.000	2.200	225
2	494302.395	101383.250	3.862	1.962	900	1	S1.000	1.900	225
									
						0	S1.001	1.900	225
3	494330.501	101389.806	2.830	1.160	900	1	S1.001	1.670	225
									
						0	S1.002	1.670	300
4	494329.938	101429.136	2.830	1.350	900	1	S1.002	1.480	300
									
						0	S1.003	1.480	300
5	494323.972	101429.136	2.975	1.545	1200	1	S1.003	1.430	300
									
						0	S1.004	1.430	450
6	494306.862	101439.388	3.100	1.840	1500	1	S1.004	1.370	450
									
						0	S1.005	1.260	600
7	494292.142	101448.208	3.250	2.030	1500	1	S1.005	1.220	600
									
						0	S1.006	1.220	600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	494266.340	101447.867	3.479	2.319	1500	1	S1.006	1.160	600
									
						0	S1.007	1.160	600
9	494258.481	101455.349	3.400	1.600	1200				
						0	S2.000	1.800	225
10	494251.543	101455.258	3.450	2.250	1500	1	S2.000	1.425	225
									
						0	S2.001	1.200	450
11	494239.341	101447.464	3.593	2.493	1800	1	S2.001	1.100	450
						2	S1.007	1.100	600
									
						0	S1.008	1.100	600
12	494098.649	101499.328	3.620	0.620	900				
						0-1	S3.000	3.000	150
						0-2	S9.000	3.000	150
13	494099.603	101435.147	3.650	1.075	900	1	S3.000	2.575	150
									
						0	S3.001	2.575	150
14	494100.533	101370.907	3.675	1.600	900	1	S3.001	2.150	150
									
						0	S3.002	2.075	225
15	494103.680	101363.570	3.706	1.911	1500	1	S3.002	2.020	225
									
						0	S3.003	1.795	450
16	494124.534	101363.795	3.704	2.149	1500	1	S3.003	1.705	450
									
						0	S3.004	1.555	600
17	494158.962	101354.803	3.418	2.113	1200				
						0	S4.000	1.305	600
18	494178.252	101376.460	3.700	1.775	1200				
						0	S5.000	1.925	300
19	494182.332	101363.615	3.514	2.259	1500	1	S5.000	1.555	300
						2	S4.000	1.255	600
						3	S3.004	1.255	600
									
						0	S3.005	1.255	600
20	494220.134	101375.607	3.579	2.404	1500	1	S3.005	1.175	600
									
						0	S3.006	1.175	600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
J2	494184.083	101432.089	2.391	0.781	1200	0	S8.000A	1.610	300
22	494204.085	101432.443	3.000	1.650	1500	1	S8.000A	1.515	300
						0	S8.000	1.350	450
23	494204.244	101420.970	3.126	1.856	1500	1	S8.000	1.270	450
						0	S8.001	1.270	450
24	494204.380	101394.589	3.678	2.478	1500	1	S8.001	1.200	450
						0	S8.002	1.200	450
25	494154.037	101349.088	3.492	1.734	1200	0	S6.000	1.758	225
26	494192.894	101378.147	3.519	1.069	900	0	S7.000	2.450	150
27	494197.388	101359.599	3.340	1.925	1200	1	S7.000	1.565	150
						2	S6.000	1.490	225
						0	S6.001	1.415	300
28	494220.559	101365.203	3.256	1.946	1200	1	S6.001	1.310	300
						0	S6.002	1.310	300
29	494226.507	101366.646	3.235	1.995	1200	1	S6.002	1.240	300
						0	S6.003	1.240	300
30	494225.866	101383.980	3.623	2.503	1500	1	S8.002	1.120	450
						2	S6.003	1.120	300
						3	S3.006	1.120	600
						0	S3.007	1.120	225
31	494233.398	101386.902	3.451	2.391	1800	1	S3.007	1.060	225
						0	S3.008	1.060	750
32	494232.839	101447.511	3.456	2.526	1800	1	S1.008	1.080	600
						2	S3.008	0.930	750
						0	S1.009	0.930	750
33	494232.393	101477.837	3.456	2.596	1800	1	S1.009	0.860	750
						0	S1.010	0.860	1200

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
34	494230.095	101517.661	3.230	2.450	1800	1	S1.010	0.780	1200
						0	S1.011	0.780	1200
35	494097.702	101564.737	3.634	1.064	900	1	S9.000	2.570	150
						0	S9.001	2.570	150
36	494100.770	101572.123	3.699	1.564	1500	1	S9.001	2.510	150
						0	S9.002	2.135	450
37	494140.283	101572.672	3.699	1.849	1500	1	S9.002	2.000	450
						0	S9.003	1.850	600
38	494173.595	101573.140	3.707	1.947	1500	1	S9.003	1.760	600
						0	S9.004	1.760	600
39	494163.985	101582.507	3.517	2.627	1500	0	S10.000	0.890	600
40	494175.985	101576.646	3.499	2.629	1500	1	S10.000	0.870	600
						2	S9.004	0.870	600
						0	S9.005	0.870	600
41	494204.285	101557.358	3.415	2.615	1500	1	S9.005	0.800	600
						0	S9.006	0.800	600
J1	494182.883	101517.961	2.391	0.786	1200	0	S11.000A	1.605	225
43	494201.716	101521.011	3.000	1.605	1200	1	S11.000A	1.470	225
						0	S11.000	1.395	300
44	494201.549	101531.374	3.150	1.835	1200	1	S11.000	1.315	300
						0	S11.001	1.315	300
45	494158.278	101587.058	3.522	1.522	900	0	S12.000	2.000	225
46	494185.655	101574.790	3.275	1.785	900	1	S12.000	1.490	225
						0	S12.001	1.490	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
47	494200.191	101564.150	3.371	2.181	1200	1	S12.001	1.190	225
						0	S12.002	1.190	225
48	494204.850	101560.596	3.370	2.250	1200	1	S12.002	1.120	225
						0	S12.003	1.120	300
49	494213.587	101555.791	3.348	2.568	1800	1	S11.001	1.080	300
						2	S12.003	1.080	300
						3	S9.006	0.780	600
						0	S9.007	0.780	225
50	494226.874	101555.916	3.341	2.641	1800	1	S9.007	0.700	225
						2	S1.011	0.700	1200
						0	S1.012	0.700	450
ExMH2	494226.798	101573.518	2.860	2.220	1800	1	Ex 1	0.670	225
						2	S1.012	0.640	450
						0	Ex 2	0.670	750
ExMH1	494150.911	101606.609	3.580	1.300	1200	0	Ex 1	2.280	225
ExMH3	494245.463	101578.840	2.680	2.040	1800	1	Ex 2	0.640	750
						0	Ex 3	0.640	750
ExMH4	494277.278	101609.015	2.710	2.200	1800	1	Ex 3	0.510	750
						0	Ex 4	0.510	750
ExMH5	494340.155	101673.616	2.370	1.910	1800	1	Ex 4	0.460	750
						0	Ex 5	0.460	750
ExMH6	494379.221	101715.415	2.430	2.260	1800	1	Ex 5	0.170	750
						0	Ex 6	0.170	225
Outfall	494378.469	101722.864	2.440	2.290		1	Ex 6	0.150	225

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440	2160

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	40	0	0
100	45	0	0

Node Outfall 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)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.500	255	0.500	510	0.500	765	0.500	1020	0.500	1275	0.500
15	0.500	270	0.500	525	0.500	780	0.500	1035	0.500	1290	0.500
30	0.500	285	0.500	540	0.500	795	0.500	1050	0.500	1305	0.500
45	0.500	300	0.500	555	0.500	810	0.500	1065	0.500	1320	0.500
60	0.500	315	0.500	570	0.500	825	0.500	1080	0.500	1335	0.500
75	0.500	330	0.500	585	0.500	840	0.500	1095	0.500	1350	0.500
90	0.500	345	0.500	600	0.500	855	0.500	1110	0.500	1365	0.500
105	0.500	360	0.500	615	0.500	870	0.500	1125	0.500	1380	0.500
120	0.500	375	0.500	630	0.500	885	0.500	1140	0.500	1395	0.500
135	0.500	390	0.500	645	0.500	900	0.500	1155	0.500	1410	0.500
150	0.500	405	0.500	660	0.500	915	0.500	1170	0.500	1425	0.500
165	0.500	420	0.500	675	0.500	930	0.500	1185	0.500	1440	0.500
180	0.500	435	0.500	690	0.500	945	0.500	1200	0.500		
195	0.500	450	0.500	705	0.500	960	0.500	1215	0.500		
210	0.500	465	0.500	720	0.500	975	0.500	1230	0.500		
225	0.500	480	0.500	735	0.500	990	0.500	1245	0.500		
240	0.500	495	0.500	750	0.500	1005	0.500	1260	0.500		

Node 11 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	1.100	Product Number	CTL-SHE-0087-5000-2470-5000
Design Depth (m)	2.470	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 30 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	1.120	Product Number	CTL-SHE-0128-1000-2230-1000
Design Depth (m)	2.230	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	10.0	Min Node Diameter (mm)	1500

Node 49 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	0.780	Product Number	CTL-SHE-0086-5000-2570-5000
Design Depth (m)	2.570	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 50 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	0.700	Product Number	CTL-SHE-0137-1100-2000-1100
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	11.0	Min Node Diameter (mm)	1500

Node ExMH6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	0.510	Product Number	CTL-SHE-0165-1600-2000-1600
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	16.0	Min Node Diameter (mm)	1800

Node 4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	2.530
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	542.0	542.0	0.300	542.0	566.8

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	150.0	0.0	0.800	150.0	0.0	0.801	0.0	0.0

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	2.670
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	200.0	0.350	200.0	217.5	0.351	0.0	217.5

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.220
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	375.0	0.0	0.800	375.0	0.0	0.801	0.0	0.0

Node 17 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.320
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	770.0	0.0	0.800	770.0	0.0	0.801	0.0	0.0

Node 23 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.270
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	500.0	0.0	0.800	500.0	0.0	0.801	0.0	0.0

Node 24 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	350.0	0.0	1.200	350.0	0.0	1.201	0.0	0.0

Node 25 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	2.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	660.0	660.0	0.350	660.0	691.9	0.351	0.0	691.9

Node 26 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	2.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	137.5	137.5	0.350	137.5	152.0	0.351	0.0	152.0

Node 39 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	0.920
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	780.0	0.0	1.200	780.0	0.0	1.201	0.0	0.0

Node 45 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	2.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	313.0	313.0	0.350	313.0	335.0	0.351	0.0	335.0

Node 45 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	2.860
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	132.0	132.0	0.420	132.0	149.1

DRAINAGE STRATEGY IMPORTANT NOTES

Vortex Flow control @ SW50 is restricted to greenfield runoff rate (QBAR) based off a positively drained area of 3.719ha. In line with Arun District Council's supplementary requirements for surface water drainage proposals (i.e. IH124 method) this equates to 11l/s.

C04

The drainage philosophy for our site is that each unit is restricted locally to utilise storage within the associated service yard / car park attenuation crate storage / SuDS feature with a final flow control of 11l/s before entering existing network.

The proposed drainage will incorporate the existing highway drainage and analysed to ensure flood risk is not increased within the existing road. The proposed development Qbar runoff rate will be added to the existing 5 l/s highway discharge at the final flow control chamber which would be 11l/s + 5l/s = 16l/s.

There is a short length of existing 150mm highway drain in the estate road that is too small and needs to be replaced. It is assumed all existing highway drainage is private and no drainage is to be adopted.

Bypass separators and or permeable paving will be provided in car parks (lower risk of pollutants) with full retention oil separators provided in the higher risk service yards to minimise risk of pollutants entering the drainage system.

It is expected the lower dock leveller area will temporarily pond/flood in the more extreme flood events, up to the 100yr + 45% climate change event. The dock area at a flood depth <350mm at dock face could accommodate approx 687m³.

A quick storage estimate for the proposed development suggests for an area of 3.719ha would require between 3705 - 4540m³ of storage on site to accommodate the 100yr + 45% climate change event. This updated drainage strategy allows for approx 3370m³ of storage within the network with the addition of 687m³ storage in the dock area and storage potential in the SuDS features which haven't been accounted for in the modelling. This proves the strategy can adequately accommodate the site even in this extreme storm event.

C04

Drainage Notes

1. All adoptable surface and foul water drainage works (including connections to the Public Sewers) to be carried out in strict accordance with the 'Sewer Sector Guidance' and any specific requirements of the adopting authority.
2. All adoptable highway drainage works to be carried out in strict accordance with the Local Highway Authority requirements and the DfT MCHW Specification for Highway Works.
3. All private drainage works are to be carried out in accordance with Building Regulations Part H, BS EN 752, the Civil Engineering Specification for the Water Industry and, where provided, the BWB Drainage Specification.
4. Where applicable the contractor shall allow free and full access to the drainage works for the local authority, highway authority, drainage authority or the overseeing organisation.
5. The Contractor shall check the condition of the existing drainage and ensure it is structurally sound and free from blockages / obstructions. Where necessary the Contractor is to replace and/or undertake remedial works on defective drainage. All drainage is to be cleaned by jetting, removing all debris from site to an appropriately licensed tip,
6. The exact position, level, line, size and use of existing drainage is to be confirmed on site. Any discrepancies to be reported to the engineer prior to the commencement of works.
7. For new connections to existing manholes, existing benching is to be broken out and reformed to suit. Concrete/brick surround to be made good.
8. All temporary works associated with the construction of the drainage works shall be the responsibility of the contractor, including the protection of any uncovered/shallow pipework against construction traffic.
9. The Contractor is responsible for obtaining and paying for all necessary permissions to enable construction of the works to be undertaken, including but not limited to licences for street works and connections to existing sewers. This includes Section 106 applications when connecting directly or indirectly to the public sewerage network (complete application to be made at least 3 weeks prior to the planned outfall construction works).
10. Any damage caused to existing footways, roads or other third party property to be made good.
11. Under roads and external paved areas all materials within 450mm of finished levels to be non-frost susceptible. Reinstatements shall be undertaken in accordance with the BWB standard detail.
12. All proposed chamber covers are to be marked permanently with "SWS" (or equiv.) on surface water sewers and "FWS" (or equiv.) on foul sewers. all covers to be in accordance with BS EN 124.
13. Unless noted otherwise, all lateral connections are to be installed with level soffits to the diameters and gradients shown on the layout drawing. Any pipe bends should be provided to suit the direction of flow & no pipework should be downsized in the direction of flow.
14. The number and location of all RWPs is shown indicatively only. To be confirmed by Architect / M&E contractor prior to commencement of works.
15. Foul water 'pop up positions' are shown indicatively only, to be confirmed by the Architect / M&E contractor prior to commencement of works. Refer to Architect plans for setting out of internal foul pop up positions.
16. All RWPs and SVPs to be fitted with rodable access plates. All foul drains to have rodable access.
17. Above ground drainage details to be designed/confirmed by the Architect/M&E contractor, including ventilation of the foul drainage system.
18. Proposed drainage passing through new foundations to be sleeved with cast-in oversized pipework.
19. All specialist/proprietary products such as separators, attenuation tanks, channel drains, soakaways, package pumping station and water treatment units to be installed as per the manufacturer's installation details and specifications..

Notes

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2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. This drawing is to read in conjunction with BWB drawings: 243912-BWB-EXT-XX-D-C-0001_Civil Engineering Notes, 243912-BWB-EXT-XX-D-C-0530_Drainage Catchment Plan, 243912-BWB-EXT-XX-D-C-0560_Drainage Construction Details Sheet 1 & 243912-BWB-EXT-XX-D-C-0560_Drainage Construction Details Sheet 2
6. For details of approved FRA including original drainage strategy please refer to: Oldlands Farm Phase 3 FRA & DS dated Dec 2022.
7. For the corresponding hydraulic model refer to BWB Report: 243912-BWB-EXT-XX-T-C-0500-[A4-C06]_Drainage Hydraulic Report

Key Plan

C04

- Site Boundary
- Surface Water Drainage
- Foul Drainage
- Existing Surface Water Drainage
- Existing Foul Water Drainage
- Kerb Drain
- Channel Drain
- Filter Drain
- Indicative Siphonic Drainage
- Existing Highway Drainage to be Removed / Infilled
- HydroBrake SW Flow Control Chamber
- SW Siphonic Vented Chamber
- Car Parking Bay Permeable Paving
- SW Attenuation Tanks

Important CDM / H&S Notes

For more information of specified hazard refer to BWB Designers Risk Assessment: 243912-BWB-EXT-XX-HS-C-0001

Any construction personnel including operatives intending to construct the designs shown on this drawing should ensure that they have been regularly and thoroughly briefed by the principal Contractor on all health and safety matters and have had sight of:

1 - The full Designers and Contractors risk assessments and risk registers.
2 - The developed construction health and safety plan.
3 - The Contractors construction method statements.

Hazards that are obvious to a competent Contractor are not shown, as are every day and low risk hazards.

C04	18.09.25	Layout updated to suit masterplan changes.	DH	TAJ
C03	10.09.25	Layout updated to suit masterplan changes. Additional SuDS features added. Pipe sizes and Chambers adjusted.	DH	TAJ
C02	22.08.25	Pipe 1.010 & 1.011 upsized to 1200Ø	DH	DH
C01	20.12.24	Issued for tender	DH	TAJ
P02	29.11.24	Issued for comment	DH	TAJ
P01	11.11.24	Preliminary Issue	DH	TAJ
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

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Manchester | 0161 233 4260
Nottingham | 0115 924 1100
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Client

PANATTONI

Project Title

Newlands Road, Bognor Regis

Drawing Title

Drainage Layout

Drawn:	J.Arnold		Reviewed:	T.Jones	
BWB Ref:	243912	Date:	08.11.24	Scale@A1:	1:500

Drawing Status

TENDER

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
243912-BWB-EXT-XX-D-C-0500	**A4**	**C04**

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Lined filter trench designed to act as primary SuDS feature with overflow depression area which could act as additional storage of approx 88m³ @ 420mm deep during high intensity storm durations and infiltrate as a secondary treatment measure.
Maximum water level: 3.28m AOD.

Maximum water level: 3.28m AOD.

Section B

Unit 3
(CIH 12.5m)
Unit 3 FFL : 3.725m AOD

Unit 2
(CIH 12.5m)
Unit 2 FFL : 3.725m AOD

Unit 1
(CIH 10m)
Unit 1 FFL : 3.725m AOD

Rainwater harvesting utilised for flushing toilets as outlined in the Panattoni Development Specification subject to detailed design

Rainwater harvesting utilised for flushing toilets as outlined in the Panattoni Development Specification subject to detailed design

Rainwater harvesting utilised for flushing toilets as outlined in the Panattoni Development Specification subject to detailed design

100 Year + 45%
Node: J1
CL: 2.391m AOD
Flood Volume: 55m³

100 Year + 45%
Docks Designed Flood Area
CL: 2.391m AOD
Flood Volume: 687m³ (J1+J2)
Maximum Flood Depth: 480mm
Maximum Water Level: 2.87m AOD

100 Year + 45%
Node: J2
CL: 2.391m AOD
Flood Volume: 632m³

Substation moved into Unit 1 car parking area to provide additional space for SuDS feature

Proposal to reduce service yard to include 2m gravel strip. This will allow space for the footway drainage to discharge into a filter drain and reduces the impermeable area.

48m Service Yard Extents

Car park arrangements subject to change to allow space for SuDS feature. This area benefits from a slightly lower ground water table and therefore infiltration will be encouraged for this pond.
Maximum water level: 3.30m AOD.

This car parking area provides 26 bays. When combined with the 10 parking spaces to the south this matches the previous layout.

10 parking bays to be relocated here to free up space for SuDS feature to north.

100 Year + 45%
Node: 4
CL: 2.830m AOD
Flood Volume: 5m³

35m Service Yard Extents

Proposal to reduce service yard to 35m to allow additional area for SuDS feature. Filter drain to be offset to edge of service yard ensuring all flows are adequately treated. Higher Suds feature provides amenity/biodiversity and storage for larger storm events.

Lined filter trench designed to act as primary SuDS feature with overflow depression area which could act as additional storage of approx 163m³ during high intensity storm durations and infiltrate as a secondary treatment measure.
Maximum water level: 2.83m AOD.

Maximum water level: 2.83m AOD.

100 Year + 45%
Node: 3
CL: 2.830m AOD
Flood Volume: <1m³

100 Year + 45%
Node: 1
CL: 3.376m AOD
Flood Volume: 2m³

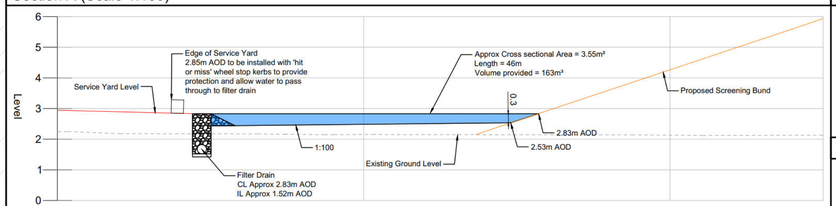
Section A

P03

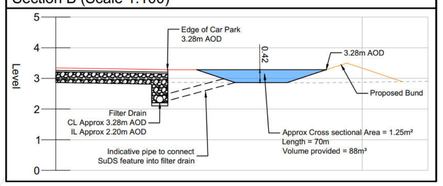
Shripney Rd

Almaty Cl

Section A (Scale 1:100)



Section B (Scale 1:100)



Notes

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3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Legend

- Soft Landscaping Area
- SuDS Pond / Overflow Wetlands Area Feature
- SuDS Permeable Paving
- SuDS Flood Storage Area
- SuDS Filter Drain
- Topsoil Mound to remain as proposed displayed at 0.250m intervals

P03	18.09.25	Updated to latest masterplan amendments	DH	TAJ
P02	12.09.25	Included more information	RA	DH
P01	10.09.25	Issued for Information	DH	TAJ
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

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Client

PANATTONI

Project Title

Newlands Road, Bognor Regis

Drawing Title

SuDS Overview Plan & Masterplan Amendments

Drawn:	D.Holmes		Reviewed:	T.Jones	
BWB Ref:	243912	Date:	Sept 25	Scale@A1:	1:500

Drawing Status

For Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
243912-BWB-EXT-XX-D-C-0537	**S2**	**P03**

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Proposed Development Vortex Flow Control restricted to 11l/s (QBAR). Based off IH124 method - refer to BWB report: 243912-BWB-EXT-XX-T-C-0502-S2-P02_Proposed Development Greenfield Runoff Estimation

P02

Catchment area of the existing highway has been altered to suit the proposed development masterplan, levels and drainage. The site is restricted back to QBAR.

Substation moved into Unit 1 car parking area to provide additional space for SuDS feature

P02

This car parking area provides 26 bays. When combined with the 10 parking spaces to the south this matches the previous layout.

P02

P02

Flow control chamber to be installed with a Vortex Flow Control restricted back to 16l/s

	Vortex Flow Control Discharge Rate (l/s)
Existing Highway	5
Proposed Development (Restricted to QBAR)	11
Combined Network	16

Newlands Road

Notes

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2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. For Existing Highway Model results refer to BWB hydraulic Report: 243912-BWB-EXT-XX-T-C-0505-S2-P02_Existing Highway Drainage Hydraulic Report
6. For Proposed Development Greenfield runoff calculations refer to BWB Report: 243912-BWB-EXT-XX-T-C-0502-S2-P02_Proposed Development Greenfield Runoff Estimation
7. To be read in conjunction with BWB hydraulic Report: 243912-BWB-EXT-XX-T-C-0500-A4-C06_Drainage Hydraulic Report
8. Cover and invert levels of existing drainage based on Sitech Surveying Services topographical survey: 15193-21 - Estate Road - Underground Services Survey dated March 2021.

Key

- Proposed Development Site Boundary
- Existing Highway Drainage Catchment (0.606ha)
- Existing Highway Drainage Catchment with Proposed Development (0.594ha)
- Positively Drained Impermeable Catchment (3.664ha)
- Positively Drained Landscaping Catchment (0.222ha)

∴The total positively drained area has been based off a combination of 100% of impermeable areas and 25% for positively drained landscaping area to give a total catchment area of (3.664+(0.222*0.25)) = **3.719ha**

P02

Proposed Development Drainage Overview

This sketch has been produced to demonstrate the drainage philosophy behind the proposed development.

The proposed development will be restricted back to Qbar greenfield runoff rates calculated in line with ARUN supplementary requirements for surface water drainage proposals (i.e. IH124 method).

The proposed drainage will incorporate the existing highway drainage and analysed to ensure flood risk is not increased within the existing road. The proposed development Qbar runoff rate will be added to the existing 5 l/s highway discharge at the final flow control chamber.

Rev	Date	Details of issue / revision	Drw	Rev
P01	18.09.25	Updated to latest masterplan amendments	DH	TAJ
P01	10.09.25	Issued for information	DH	TAJ

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PANATTONI

Project Title

Newlands Road, Bognor Regis

Drawing Title

Proposed Development Discharge Rate

Drawn:	D.Holmes		Reviewed:	T.Jones	
BWB Ref:	243912	Date:	Sept 25	Scale@A1:	1:500

Drawing Status

For Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
243912-BWB-EXT-XX-G-C-0536	**S2**	**P02**

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