CAUSEWAY

Drainage Design Report

Hill House Bakers Lane, Chartham Canterbury, CT4 7QB

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Rainfall Methodology	FSR
Return Period (years)	1
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.450
CV	0.750
Time of Entry (mins)	5.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	0.400
Enforce best practice design rules	✓

	Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)	Notes
✓	G1	0.013	5.00		34.740	Manhole	Adoptable	450	600			0.450	
✓	G2	0.013	5.00		35.050	Manhole	Adoptable	450	600			0.410	
✓	G3	0.013	5.00		35.400	Manhole	Adoptable	450	600			0.450	
✓	G4	0.013	5.00		36.950	Manhole	Adoptable	450	600			0.450	
✓	G5	0.013	5.00		36.300	Manhole	Adoptable	450	600			0.450	
✓	G6	0.013	5.00		34.700	Manhole	Adoptable	450	600			0.450	
✓	G7	0.013	5.00		33.230	Manhole	Adoptable	450	600			0.450	
✓	G8	0.013	5.00		33.100	Manhole	Adoptable	450	600			0.450	
✓	G9	0.013	5.00		33.350	Manhole	Adoptable	450	600			0.450	
✓	G10	0.013	5.00		34.000	Manhole	Adoptable	450	600			0.450	
✓	G11	0.013	5.00		33.050	Manhole	Adoptable	450	600			0.450	
✓	G12	0.013	5.00		32.000	Manhole	Adoptable	450	600			0.450	
✓	G13	0.013	5.00		31.040	Manhole	Adoptable	450	600			0.450	
✓	G14	0.013	5.00		29.420	Manhole	Adoptable	450	600			0.450	
✓	G15	0.013	5.00		29.160	Manhole	Adoptable	450	600			0.450	
✓	G17	0.013	5.00		27.930	Manhole	Adoptable	450	600			0.450	
✓	G18	0.013	5.00		27.300	Manhole	Adoptable	450	600			0.450	
✓	S1				36.200	Manhole	Adoptable	1200				2.350	
✓	SJ1				36.950	Junction						3.230	
✓	S2				37.400	Manhole	Adoptable	1200				3.790	
✓	SJ2				36.300	Junction						3.490	
✓	SJ3				34.700	Junction						2.740	
✓	S3				33.890	Manhole	Adoptable	1200				2.490	
✓	S4				33.050	Manhole	Adoptable	1200				1.690	
✓	SJ4				32.000	Junction						1.420	
✓	SJ5				31.040	Junction						1.670	
✓	SJ6				29.420	Junction						1.650	
✓	SJ7				29.160	Junction						1.520	
✓	S5				28.550	Manhole	Adoptable	1200				1.350	
✓	S6				28.750	Manhole	Adoptable	1200				2.050	
✓	S7				28.310	Manhole	Adoptable	1200	2500			1.710	
✓	S8				28.000	Junction						1.500	
✓	S9				33.130	Manhole	Adoptable	1200				1.370	
✓	SJ8				33.350	Junction						1.730	
✓	G16		5.00		28.550	Manhole	Adoptable	450	600			0.500	

	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)	Notes
✓	1.000	G1	S1	1.724	30.5	1.8	0.300	2.200	0.300	2.200	0.013	0.0	24	0.937	
✓	2.000	G2	S1	3.089	54.6	1.8	0.260	2.200	0.260	2.200	0.013	0.0	18	1.415	
✓	3.000	G3	S1	2.606	46.1	1.8	0.300	2.200	0.300	2.200	0.013	0.0	20	1.264	
✓	1.001	S1	SJ1	1.031	18.2	5.3	2.200	3.080	2.200	3.080	0.039	0.0	55	0.895	
✓	4.000	G4	SJ1	8.075	142.7	1.8	0.300	3.080	0.300	3.080	0.013	0.0	11	2.711	
✓	1.002	SJ1	S2	1.000	17.7	7.0	3.080	3.640	3.080	3.640	0.052	0.0	66	0.945	
✓	1.003	S2	SJ2	2.392	42.3	7.0	3.640	3.340	3.340	3.640	0.052	0.0	41	1.779	
✓	5.000	G5	SJ2	9.621	75.6	1.8	0.350	3.390	0.350	3.390	0.013	0.0	11	3.944	
✓	1.004	SJ2	SJ3	1.895	33.5	8.8	3.340	2.590	2.590	3.340	0.065	0.0	52	1.602	
✓	6.000	G6	SJ3	9.725	171.9	1.8	0.300	2.590	0.300	2.590	0.013	0.0	11	3.154	
✓	1.005	SJ3	S3	2.359	41.7	10.6	2.590	2.260	2.260	2.590	0.078	0.0	51	1.971	
✓	7.000	G7	S9	3.261	57.6	1.8	0.300	1.200	0.300	1.200	0.013	0.0	18	1.463	
✓	8.000	G8	S9	5.589	98.8	1.8	0.300	1.200	0.300	1.200	0.013	0.0	14	2.122	
✓	7.001	S9	SJ8	0.946	16.7	3.5	1.220	1.580	1.220	1.580	0.026	0.0	47	0.750	
✓	9.000	G9	SJ8	4.800	84.8	1.8	0.300	1.580	0.300	1.580	0.013	0.0	15	1.921	
✓	7.002	SJ8	S3	0.999	17.7	5.3	1.580	2.260	1.580	2.260	0.039	0.0	56	0.872	
✓	10.000	G10	S3	7.113	125.7	1.8	0.300	2.260	0.300	2.260	0.013	0.0	13	2.548	
✓	1.006	S3	S4	0.772	30.7	17.6	2.265	1.465	1.465	2.265	0.130	0.0	123	0.799	
✓	11.000	G11	S4	8.295	146.6	1.8	0.300	1.540	0.300	1.540	0.013	0.0	11	2.786	
✓	1.007	S4	SJ4	3.093	123.0	19.4	1.465	1.195	1.195	1.465	0.143	0.0	60	2.275	
✓	12.000	G12	SJ4	4.429	78.3	1.8	0.300	1.270	0.300	1.270	0.013	0.0	16	1.817	
✓	1.008	SJ4	SJ5	3.814	151.6	21.1	1.195	1.445	1.195	1.445	0.156	0.0	57	2.713	
✓	13.000	G13	SJ5	4.968	87.8	1.8	0.300	1.520	0.300	1.520	0.013	0.0	15	1.989	
✓	1.009	SJ5	SJ6	3.799	151.0	22.9	1.445	1.425	1.425	1.445	0.169	0.0	59	2.772	
✓	14.000	G14	SJ6	4.922	87.0	1.8	0.300	1.500	0.300	1.500	0.013	0.0	15	1.971	
✓	1.010	SJ6	SJ7	3.786	150.5	24.7	1.425	1.295	1.295	1.425	0.182	0.0	61	2.807	
✓	15.000	G15	SJ7	4.647	82.1	1.8	0.300	1.370	0.300	1.370	0.013	0.0	15	1.860	
✓	1.011	SJ7	S5	3.798	151.0	26.4	1.295	1.125	1.125	1.295	0.195	0.0	64	2.882	
✓	16.000	G16	S5	4.994	88.2	0.0	0.350	1.200	0.350	1.200	0.000	0.0	0	0.000	
✓	1.012	S5	S6	3.051	121.3	26.4	1.125	1.825	1.125	1.825	0.195	0.0	71	2.448	
✓	17.000	G17	S6	4.825	85.3	1.8	0.300	1.900	0.300	1.900	0.013	0.0	15	1.931	
✓	18.000	G18	S6	1.107	19.6	1.8	0.300	1.900	0.300	1.900	0.013	0.0	30	0.684	
✓	1.013	S6	S7	2.861	202.3	30.0	1.750	1.410	1.410	1.750	0.221	0.0	78	2.071	
✓	1.014	S7	S8	3.157	223.1	30.0	1.410	1.200	1.200	1.410	0.221	0.0	74	2.218	

Rainfall Methodology	FSR		Return Period (years)	Climate Change (%)
FSR Region	England and Wales		**100**	**40**
M5-60 (mm)	20.000			
Ratio-R	0.450			
Summer CV	0.750			
Winter CV	0.840			
Analysis Speed	Normal			
Drain Down Time (mins)	240			
Additional Storage (m^3/ha)	20.0			
Storm Durations (mins)	30			
	60			
	120			
	180			
	240			
	360			
	480			
	600			
	720			
	960			
	1440			
Check Discharge Rate(s)	x			
1 year (l/s)				
30 year (l/s)				
100 year (l/s)				
Check Discharge Volume	x			
100 year 360 minute (m^3)				

Depth/Area/Inf Area									
Node	**Base Inf Coefficient (m/hr)**	**Side Inf Coefficient (m/hr)**	**Safety Factor**	**Porosity**	**Invert Level (m)**	**Time to half empty (mins)**	**Depth (m)**	**Area (m^2)**	**Inf. Area (m^2)**
S8	1.33200	1.33200	2.0	0.95	25.400	32	0.000	55.0	55.0
							1.200	55.0	93.4
							1.201	0.0	93.4

Results for 100 year +40% Critical Storm Duration. Lowest mass balance: 100.00%															
Event	**US Node ID**	**Peak (mins)**	**Level (m)**	**Depth (m)**	**Inflow (l/s)**	**Node Vol (m^3)**	**Flood (m^3)**	**Status**	**Link ID**	**DS Node ID**	**Outflow (l/s)**	**Velocity (m/s)**	**Flow/Cap**	**Link Vol (m^3)**	**Discharge Vol (m^3)**
30 minute summer	G1	18	34.339	0.049	7.1	0.0418	0.0000	OK	1.000	S1	7.1	0.604	0.233	0.1709	
30 minute summer	G2	18	34.677	0.037	7.1	0.0331	0.0000	OK	2.000	S1	7.1	0.877	0.130	0.0889	
30 minute summer	G3	18	34.990	0.040	7.1	0.0338	0.0000	OK	3.000	S1	7.1	0.742	0.154	0.1772	
30 minute summer	G4	18	36.522	0.022	7.1	0.0182	0.0000	OK	4.000	SJ1	7.1	1.397	0.050	0.0421	
30 minute summer	G5	18	35.871	0.021	7.1	0.0177	0.0000	OK	5.000	SJ2	7.1	1.906	0.094	0.0090	
30 minute summer	G6	18	34.267	0.017	7.1	0.0143	0.0000	OK	6.000	SJ3	7.1	1.650	0.041	0.0234	
30 minute summer	G7	18	32.816	0.036	7.1	0.0302	0.0000	OK	7.000	S9	7.1	1.208	0.123	0.1005	
30 minute summer	G8	18	32.677	0.027	7.1	0.0229	0.0000	OK	8.000	S9	7.1	1.584	0.072	0.0284	
30 minute summer	G9	18	32.929	0.029	7.1	0.0248	0.0000	OK	9.000	SJ8	7.1	1.307	0.084	0.0573	
30 minute summer	G10	18	33.574	0.024	7.1	0.0199	0.0000	OK	10.000	S3	7.1	2.189	0.056	0.0409	
30 minute summer	G11	18	32.621	0.021	7.1	0.0178	0.0000	OK	11.000	S4	7.1	1.586	0.048	0.0162	
30 minute summer	G12	18	31.580	0.030	7.1	0.0259	0.0000	OK	12.000	SJ4	7.1	1.242	0.091	0.0418	
30 minute summer	G13	18	30.619	0.029	7.1	0.0244	0.0000	OK	13.000	SJ5	7.1	1.341	0.081	0.0433	
30 minute summer	G14	18	28.999	0.029	7.1	0.0245	0.0000	OK	14.000	SJ6	7.1	1.277	0.082	0.0461	
30 minute summer	G15	18	28.740	0.030	7.1	0.0252	0.0000	OK	15.000	SJ7	7.1	1.125	0.086	0.0505	
30 minute summer	G17	18	27.509	0.029	7.1	0.0248	0.0000	OK	17.000	S6	7.1	1.196	0.083	0.0345	
30 minute summer	G18	18	26.939	0.089	7.1	0.0758	0.0000	OK	18.000	S6	6.9	0.448	0.353	0.1767	
30 minute summer	S1	19	34.199	0.349	21.3	0.3942	0.0000	SURCHARGED	1.001	SJ1	19.4	1.102	1.064	0.2174	
30 minute summer	SJ1	19	34.025	0.305	25.9	0.0000	0.0000	SURCHARGED	1.002	S2	25.8	1.647	1.459	0.1545	
30 minute summer	S2	19	33.695	0.085	25.8	0.0957	0.0000	OK	1.003	SJ2	25.7	2.049	0.609	0.1831	
30 minute summer	SJ2	19	32.932	0.122	32.3	0.0000	0.0000	OK	1.004	SJ3	31.9	2.102	0.951	0.3979	
30 minute summer	SJ3	20	32.242	0.282	38.4	0.0000	0.0000	SURCHARGED	1.005	S3	37.6	2.135	0.902	0.1555	
30 minute summer	S3	19	31.765	0.365	62.8	0.4133	0.0000	SURCHARGED	1.006	S4	62.4	1.761	2.033	0.3569	
30 minute summer	S4	19	31.488	0.128	68.9	0.1446	0.0000	OK	1.007	SJ4	68.8	3.211	0.560	0.3020	
30 minute summer	SJ4	19	30.691	0.111	75.4	0.0000	0.0000	OK	1.008	SJ5	75.3	3.719	0.497	0.2916	
30 minute summer	SJ5	19	29.487	0.117	81.8	0.0000	0.0000	OK	1.009	SJ6	81.8	3.744	0.542	0.4193	
30 minute summer	SJ6	19	27.896	0.126	88.3	0.0000	0.0000	OK	1.010	SJ7	88.3	3.578	0.587	0.0388	
30 minute summer	SJ7	18	27.783	0.143	94.9	0.0000	0.0000	OK	1.011	S5	94.9	3.094	0.628	0.1613	
30 minute summer	S5	19	27.383	0.183	94.9	0.2065	0.0000	OK	1.012	S6	94.9	2.512	0.782	0.3445	
30 minute summer	S6	18	26.924	0.224	108.6	0.2538	0.0000	OK	1.013	S7	108.3	2.146	0.535	0.1529	
30 minute summer	S7	19	26.780	0.180	108.3	0.5393	0.0000	OK	1.014	S8	108.2	2.770	0.485	0.0976	
30 minute winter	S8	31	26.589	0.089	103.1	62.1503	0.0000	OK	Infiltration		17.2				
30 minute summer	S9	19	32.049	0.289	14.2	0.3265	0.0000	SURCHARGED	7.001	SJ8	12.8	0.836	0.763	0.2775	
30 minute summer	SJ8	19	31.955	0.335	19.5	0.0000	0.0000	SURCHARGED	7.002	S3	19.0	1.080	1.077	0.2491	
30 minute summer	G16	1	28.050	0.000	0.0	0.0000	0.0000	OK	16.000	S5	0.0	0.000	0.000	0.0309	