MCNAB CONSULTING ENGINEERS
Helping you Build

Greyfriars Lane, Storrington

Drainage Design Report

MCE00609

Revision: V01

Issue Date: 14 September 2026

Client Name: Pace Construction Ltd.

Client Address: Hanworth Trading Estate, Hampton Road West, Feltham, Middlesex TW13 6DH

Site Address: Former Storrington Squash Club, Greyfriars Lane, Storrington RH20 4HE

9 Old Manse Road
Eddleston
Scottish Borders
EH45 8RE
Phone: [redacted]
Email [redacted]

Control Sheet

This report has been prepared for the sole benefit, use, and information for the client. The liability of McNab Consulting Ltd with respect to the information contained in the report will not extend to any third party.

Rev	Description	Issued by	Checked	Date
01	First issue	J McNab		14/09/2026

Author	Signature	Date
James McNab BEng (Hons) Director	[redacted]	14/09/2026

Reviewed	Signature	Date

Job Title: Greyfriars Lane, Storrington

Job No: MCE00609 Date: 07/09/2026

McNab Consulting Engineers

Made By: JAM Checked By: Sheet No: Surface Water Drainage Design - 1

The existing building on site, which previously housed the squash club, will be demolished and a new residential domestic flatted block will be constructed. A below ground surface water drainage design is required for the new building.

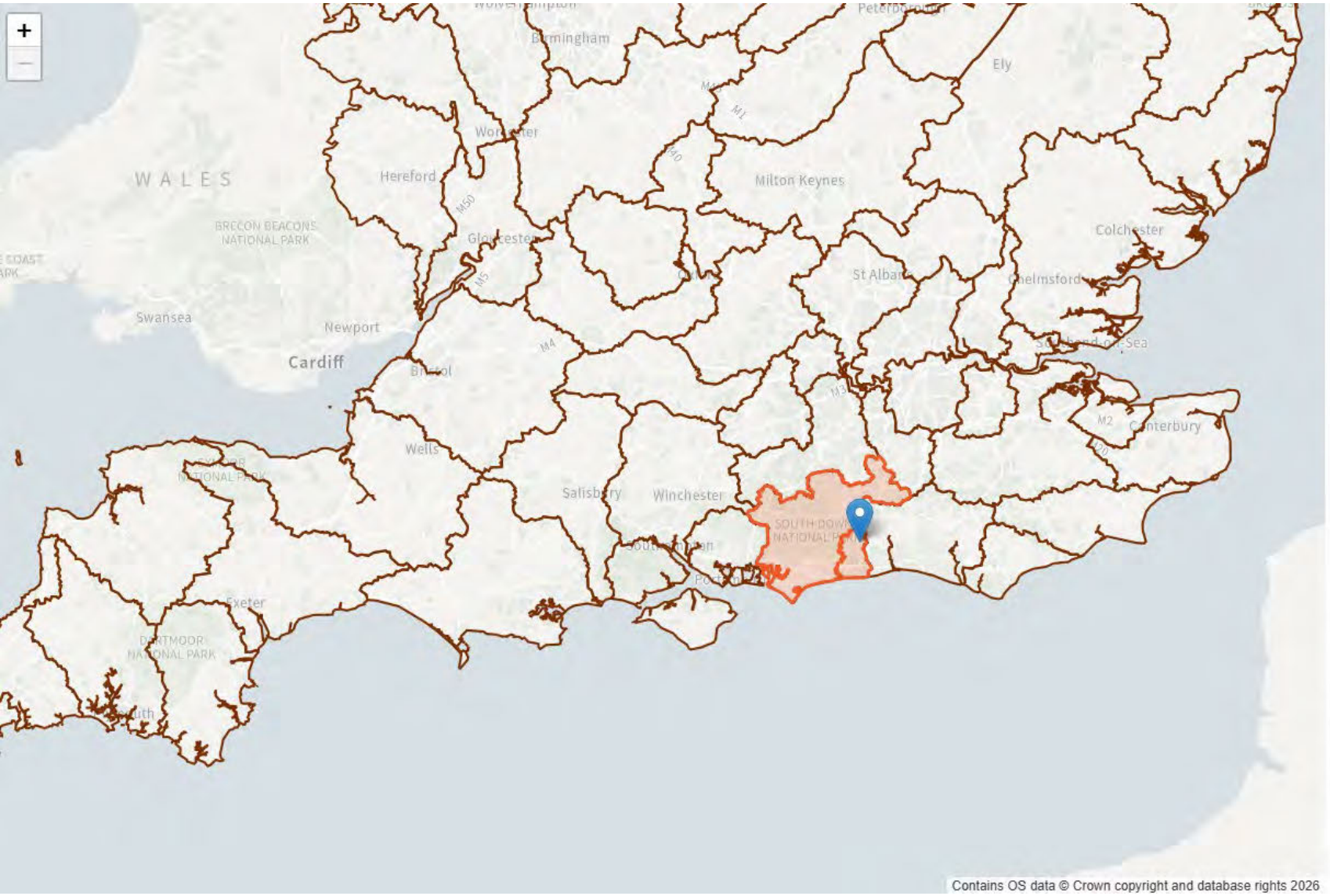
Site soakaway testing was carried out within a trial pit located below an area of the proposed new car park. The testing was carried out by Aquatech Drains Services Ltd, on 23rd July 2026. Two tests were performed within the trial pit; the results of the tests were favourable, with infiltration rates of 1.04×10^{-5} m/s and 1.06×10^{-5} m/s being recorded.

The lower of the two rates (1.04×10^{-5} m/s) will be used within the design of the new surface water drainage system.
Refer to drawings MCE00609-100, MCE00609-101 and MCE00609-102 which illustrate the existing site and drainage layout, the post-development catchments adopted for the surface water drainage design and the proposed surface water drainage scheme.

The post-development impermeable area (roof & hardstanding) for the development = $764m^2$ (or 0.0764 ha).
No allowance will be made within the design for runoff from roofs of other adjacent buildings, nor for runoff from other areas of existing car park that are to remain. It is assumed that these will continue to be served by their current drainage systems.
A climate change allowance of +45% on all storm scenarios will be used within the design model.

The soakaway will be formed using Aquacell storage crates, specified to have a minimum cover level within the car park area as per the manufacturer's recommendation. A gravel filter trench with porous pipe will be installed immediately adjacent to the bank of Aquacells, allowing transfer through the gravel into the side of the Aquacell crates, to provide a level of filtration of any fine silt particles prior to entering the soakaway.

The following print outs show the proposed drainage arrangement and the output from the modelling.



3.3% annual exceedance rainfall event

Epoch

	Central allowance	Upper end allowance
2050s	20%	35%
2070s	25%	40%

1% annual exceedance rainfall event

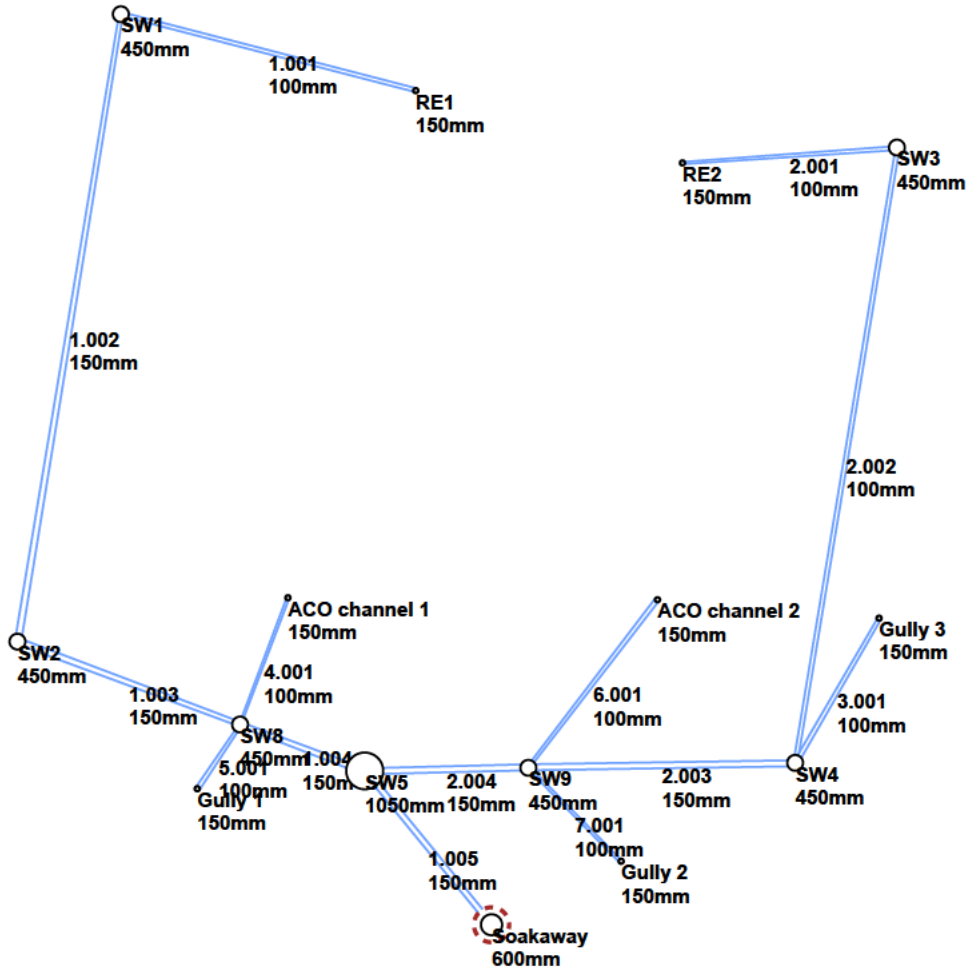
Epoch

	Central allowance	Upper end allowance
2050s	20%	45%
2070s	25%	45%

*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

This map contains information generated by Met Office Hadley Centre (2019): UKCP Local Projections on a 5km grid over the UK for 1980

McNab Consulting Engineers Ltd	McNab Consulting Engineers Ltd 9 Old Manse Road Eddleston EH45 8RE	File: Storrington surface water with adjusted CV fa Network: Storm Network James McNab 14/09/2026	Page 1



Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m³/ha)	20.0
Rainfall Events	Singular	Winter CV	1.000	Starting Level (m)	
FSR Region	England and Wales	Analysis Speed	Normal	Check Discharge Rate(s)	x
M5-60 (mm)	20.000	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.300	Drain Down Time (mins)	2000		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	45	0	0	30	45	0	0
2	45	0	0	100	45	0	0
10	45	0	0				

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

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)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Manhole Type	Depth (m)	Invert Level (m)
RE1	0.006	4.00	44.350	Adoptable	0.600	43.750
SW1	0.000		44.400	Adoptable	0.787	43.613
SW2	0.006	4.00	45.050	Adoptable	1.619	43.431
RE2	0.006	4.00	44.350	Adoptable	0.500	43.850
SW3	0.000		44.350	Adoptable	0.561	43.789
SW4	0.006	4.00	44.900	Adoptable	1.339	43.561
SW5	0.012	4.00	44.975	Adoptable	1.800	43.175
Gully 3	0.003	4.00	44.600	Adoptable	0.600	44.000
Gully 2	0.011	4.00	44.950	Adoptable	0.600	44.350
Gully 1	0.011	4.00	45.000	Adoptable	0.600	44.400
ACO channel 1	0.011	4.00	44.900	Adoptable	0.500	44.400
ACO channel 2	0.006	4.00	44.800	Adoptable	0.500	44.300
SW8			45.000	Adoptable	1.637	43.363
SW9			44.900	Adoptable	1.415	43.485
Soakaway			44.975	Adoptable	1.825	43.150

Links

	Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
?	1.001	RE1	SW1	8.659	43.750	43.663	0.087	100.0	100
?	1.002	SW1	SW2	18.184	43.613	43.431	0.182	100.0	150
✓	1.003	SW2	SW8	6.755	43.431	43.363	0.068	100.0	150
✓	1.004	SW8	SW5	3.782	43.363	43.325	0.038	100.0	150
?	2.001	RE2	SW3	6.110	43.850	43.789	0.061	100.0	100
?	2.002	SW3	SW4	17.835	43.789	43.611	0.178	100.0	100
?	2.003	SW4	SW9	7.582	43.561	43.485	0.076	100.0	150
✓	2.004	SW9	SW5	4.650	43.485	43.439	0.046	100.0	150
?	3.001	Gully 3	SW4	4.775	44.000	43.611	0.389	12.3	100
?	4.001	ACO channel 1	SW8	3.872	44.400	44.323	0.077	50.0	100
?	5.001	Gully 1	SW8	2.204	44.400	44.356	0.044	50.0	100
?	6.001	ACO channel 2	SW9	6.049	44.300	44.179	0.121	50.0	100
?	7.001	Gully 2	SW9	3.753	44.350	44.275	0.075	50.0	100
?	1.005	SW5	Soakaway	5.688	43.175	43.150	0.025	227.5	150

	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)	Pro Depth (mm)	Pro Velocity (m/s)
?	1.001	RE1	SW1	0.769	6.0	0.8	0.500	0.637	0.500	0.637	0.006	25	0.531
?	1.002	SW1	SW2	1.005	17.8	0.8	0.637	1.469	0.637	1.469	0.006	22	0.510
✓	1.003	SW2	SW8	1.005	17.8	1.6	1.469	1.487	1.469	1.487	0.012	31	0.628
✓	1.004	SW8	SW5	1.005	17.8	4.6	1.487	1.500	1.487	1.500	0.034	52	0.843
?	2.001	RE2	SW3	0.769	6.0	0.8	0.400	0.461	0.400	0.461	0.006	25	0.531
?	2.002	SW3	SW4	0.769	6.0	0.8	0.461	1.189	0.461	1.189	0.006	25	0.531
?	2.003	SW4	SW9	1.005	17.8	2.0	1.189	1.265	1.189	1.265	0.015	34	0.670
✓	2.004	SW9	SW5	1.005	17.8	4.3	1.265	1.386	1.265	1.386	0.032	51	0.833
?	3.001	Gully 3	SW4	2.217	17.4	0.4	0.500	1.189	0.500	1.189	0.003	11	0.903
?	4.001	ACO channel 1	SW8	1.092	8.6	1.5	0.400	0.577	0.400	0.577	0.011	29	0.823
?	5.001	Gully 1	SW8	1.092	8.6	1.5	0.500	0.544	0.500	0.544	0.011	29	0.823
?	6.001	ACO channel 2	SW9	1.092	8.6	0.8	0.400	0.621	0.400	0.621	0.006	21	0.682
?	7.001	Gully 2	SW9	1.092	8.6	1.5	0.500	0.525	0.500	0.525	0.011	29	0.823
?	1.005	SW5	Soakaway	0.662	11.7	10.6	1.650	1.675	1.650	1.675	0.078	112	0.748

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Node Soakaway Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.03744	Invert Level (m)	42.150	Depth (m)	1.600
Side Inf Coefficient (m/hr)	0.03744	Time to half empty (mins)	1430	Inf Depth (m)	1.600
Safety Factor	1.8	Pit Width (m)	4.000	Number Required	1
Porosity	0.95	Pit Length (m)	12.000		

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 1 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	10	43.786	0.036	1.6	0.0079	0.0000	OK
15 minute summer	SW1	10	43.643	0.030	1.6	0.0048	0.0000	OK
15 minute summer	SW2	10	43.474	0.043	3.2	0.0100	0.0000	OK
15 minute summer	RE2	10	43.887	0.037	1.6	0.0095	0.0000	OK
15 minute summer	SW3	10	43.825	0.036	1.6	0.0057	0.0000	OK
15 minute summer	SW4	10	43.609	0.048	4.0	0.0120	0.0000	OK
15 minute summer	SW5	10	43.395	0.220	20.5	0.2194	0.0000	SURCHARGED
15 minute summer	Gully 3	10	44.015	0.015	0.8	0.0018	0.0000	OK
15 minute summer	Gully 2	10	44.394	0.044	2.9	0.0168	0.0000	OK
15 minute summer	Gully 1	10	44.446	0.046	2.9	0.0175	0.0000	OK
15 minute summer	ACO channel 1	10	44.444	0.044	2.9	0.0201	0.0000	OK
15 minute summer	ACO channel 2	10	44.331	0.031	1.6	0.0079	0.0000	OK
15 minute summer	SW8	10	43.448	0.085	9.0	0.0738	0.0000	OK
15 minute summer	SW9	10	43.566	0.081	8.5	0.0705	0.0000	OK
1440 minute winter	Soakaway	1080	42.702	-0.448	1.4	25.1792	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 summer	RE1	1.001	SW1	1.6	0.639	0.265	0.0217	
15 minute summer	SW1	1.002	SW2	1.6	0.481	0.090	0.0609	
15 minute summer	SW2	1.003	SW8	3.2	0.445	0.180	0.0489	
15 minute summer	RE2	2.001	SW3	1.6	0.635	0.265	0.0156	
15 minute summer	SW3	2.002	SW4	1.6	0.642	0.262	0.0439	
15 minute summer	SW4	2.003	SW9	4.0	0.546	0.224	0.0555	
15 minute summer	SW5	1.005	Soakaway	20.4	1.162	1.743	0.0962	
15 minute summer	Gully 3	3.001	SW4	0.8	1.106	0.046	0.0035	
15 minute summer	Gully 2	7.001	SW9	2.9	0.931	0.338	0.0117	
15 minute summer	Gully 1	5.001	SW8	2.9	0.905	0.338	0.0071	
15 minute summer	ACO channel 1	4.001	SW8	2.9	0.931	0.338	0.0121	
15 minute summer	ACO channel 2	6.001	SW9	1.6	0.814	0.187	0.0119	
15 minute summer	SW8	1.004	SW5	9.0	0.937	0.505	0.0362	
15 minute summer	SW9	2.004	SW5	8.4	0.926	0.476	0.0424	
1440 minute winter	Soakaway	Infiltration		0.4				38.5

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 2 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	10	43.791	0.041	2.0	0.0090	0.0000	OK
15 minute summer	SW1	10	43.647	0.034	2.0	0.0054	0.0000	OK
15 minute summer	SW2	10	43.482	0.051	4.0	0.0118	0.0000	OK
15 minute summer	RE2	10	43.892	0.042	2.0	0.0108	0.0000	OK
15 minute summer	SW3	10	43.829	0.040	2.0	0.0064	0.0000	OK
15 minute summer	SW4	10	43.615	0.054	5.0	0.0135	0.0000	OK
15 minute summer	SW5	10	43.467	0.292	25.5	0.2915	0.0000	SURCHARGED
15 minute summer	Gully 3	10	44.017	0.017	1.0	0.0020	0.0000	OK
15 minute summer	Gully 2	10	44.401	0.051	3.7	0.0195	0.0000	OK
15 minute summer	Gully 1	10	44.453	0.053	3.7	0.0204	0.0000	OK
15 minute summer	ACO channel 1	10	44.451	0.051	3.7	0.0233	0.0000	OK
15 minute summer	ACO channel 2	10	44.335	0.035	2.0	0.0089	0.0000	OK
15 minute summer	SW8	10	43.485	0.122	10.9	0.1054	0.0000	OK
15 minute summer	SW9	10	43.580	0.095	10.7	0.0819	0.0000	OK
1440 minute summer	Soakaway	990	42.846	-0.304	2.4	31.7482	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 summer	RE1	1.001	SW1	2.0	0.677	0.331	0.0256	
15 minute summer	SW1	1.002	SW2	2.0	0.503	0.113	0.0746	
15 minute summer	SW2	1.003	SW8	4.1	0.433	0.231	0.0694	
15 minute summer	RE2	2.001	SW3	2.0	0.669	0.331	0.0185	
15 minute summer	SW3	2.002	SW4	2.0	0.682	0.329	0.0519	
15 minute summer	SW4	2.003	SW9	5.0	0.572	0.280	0.0660	
15 minute summer	SW5	1.005	Soakaway	25.4	1.443	2.171	0.0986	
15 minute summer	Gully 3	3.001	SW4	1.0	1.178	0.057	0.0041	
15 minute summer	Gully 2	7.001	SW9	3.7	0.986	0.431	0.0141	
15 minute summer	Gully 1	5.001	SW8	3.7	0.958	0.431	0.0085	
15 minute summer	ACO channel 1	4.001	SW8	3.7	0.986	0.431	0.0145	
15 minute summer	ACO channel 2	6.001	SW9	2.0	0.863	0.233	0.0140	
15 minute summer	SW8	1.004	SW5	11.0	0.921	0.622	0.0615	
15 minute summer	SW9	2.004	SW5	10.7	0.977	0.600	0.0507	
1440 minute summer	Soakaway	Infiltration		0.4				45.0

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 10 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	10	43.802	0.052	3.0	0.0114	0.0000	OK
15 minute summer	SW1	11	43.688	0.075	3.0	0.0119	0.0000	OK
15 minute summer	SW2	11	43.683	0.252	5.8	0.0588	0.0000	SURCHARGED
15 minute summer	RE2	10	43.903	0.053	3.0	0.0137	0.0000	OK
15 minute summer	SW3	10	43.840	0.051	3.0	0.0081	0.0000	OK
15 minute summer	SW4	11	43.687	0.126	7.5	0.0314	0.0000	OK
15 minute summer	SW5	11	43.624	0.449	34.9	0.4484	0.0000	SURCHARGED
15 minute summer	Gully 3	9	44.020	0.020	1.5	0.0024	0.0000	OK
15 minute summer	Gully 2	10	44.417	0.067	5.6	0.0257	0.0000	OK
15 minute summer	Gully 1	10	44.470	0.070	5.6	0.0269	0.0000	OK
15 minute summer	ACO channel 1	10	44.467	0.067	5.6	0.0307	0.0000	OK
15 minute summer	ACO channel 2	10	44.343	0.043	3.0	0.0112	0.0000	OK
15 minute summer	SW8	11	43.673	0.310	15.7	0.2685	0.0000	SURCHARGED
15 minute summer	SW9	11	43.674	0.189	15.3	0.1640	0.0000	SURCHARGED
1440 minute winter	Soakaway	1080	43.170	0.020	2.3	46.5229	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 summer	RE1	1.001	SW1	3.0	0.749	0.497	0.0347	
15 minute summer	SW1	1.002	SW2	2.9	0.518	0.161	0.2396	
15 minute summer	SW2	1.003	SW8	6.2	0.547	0.349	0.1189	
15 minute summer	RE2	2.001	SW3	3.0	0.736	0.497	0.0252	
15 minute summer	SW3	2.002	SW4	3.0	0.733	0.501	0.0893	
15 minute summer	SW4	2.003	SW9	7.0	0.600	0.393	0.1267	
15 minute summer	SW5	1.005	Soakaway	35.0	1.987	2.989	0.0991	
15 minute summer	Gully 3	3.001	SW4	1.5	1.315	0.086	0.0177	
15 minute summer	Gully 2	7.001	SW9	5.6	1.079	0.653	0.0195	
15 minute summer	Gully 1	5.001	SW8	5.6	1.048	0.653	0.0118	
15 minute summer	ACO channel 1	4.001	SW8	5.6	1.078	0.653	0.0201	
15 minute summer	ACO channel 2	6.001	SW9	3.0	0.958	0.350	0.0190	
15 minute summer	SW8	1.004	SW5	15.4	0.872	0.865	0.0666	
15 minute summer	SW9	2.004	SW5	14.7	1.034	0.829	0.0819	
1440 minute winter	Soakaway	Infiltration		0.5				71.2

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	11	43.876	0.126	3.9	0.0275	0.0000	SURCHARGED
15 minute summer	SW1	11	43.851	0.238	3.8	0.0378	0.0000	SURCHARGED
15 minute summer	SW2	11	43.841	0.410	6.9	0.0956	0.0000	SURCHARGED
15 minute summer	RE2	11	43.915	0.065	3.9	0.0168	0.0000	OK
15 minute summer	SW3	11	43.904	0.115	3.9	0.0182	0.0000	SURCHARGED
15 minute summer	SW4	11	43.857	0.296	9.5	0.0736	0.0000	SURCHARGED
15 minute summer	SW5	11	43.763	0.588	41.8	0.5872	0.0000	SURCHARGED
15 minute summer	Gully 3	10	44.022	0.022	1.9	0.0026	0.0000	OK
15 minute summer	Gully 2	10	44.431	0.081	7.1	0.0312	0.0000	OK
15 minute summer	Gully 1	10	44.485	0.085	7.1	0.0327	0.0000	OK
15 minute summer	ACO channel 1	10	44.481	0.081	7.1	0.0371	0.0000	OK
15 minute summer	ACO channel 2	10	44.351	0.051	3.9	0.0131	0.0000	OK
15 minute summer	SW8	11	43.829	0.466	18.7	0.4039	0.0000	SURCHARGED
15 minute summer	SW9	11	43.835	0.350	18.5	0.3033	0.0000	SURCHARGED
1440 minute summer	Soakaway	1050	43.460	0.310	4.1	59.8015	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 summer	RE1	1.001	SW1	3.8	0.784	0.622	0.0678	
15 minute summer	SW1	1.002	SW2	5.0	0.475	0.284	0.3201	
15 minute summer	SW2	1.003	SW8	8.7	0.594	0.491	0.1189	
15 minute summer	RE2	2.001	SW3	3.9	0.777	0.639	0.0404	
15 minute summer	SW3	2.002	SW4	3.8	0.708	0.634	0.1395	
15 minute summer	SW4	2.003	SW9	8.5	0.604	0.481	0.1335	
15 minute summer	SW5	1.005	Soakaway	41.6	2.365	3.559	0.0991	
15 minute summer	Gully 3	3.001	SW4	1.9	1.324	0.109	0.0218	
15 minute summer	Gully 2	7.001	SW9	7.1	1.123	0.828	0.0237	
15 minute summer	Gully 1	5.001	SW8	7.1	1.094	0.828	0.0142	
15 minute summer	ACO channel 1	4.001	SW8	7.1	1.122	0.828	0.0244	
15 minute summer	ACO channel 2	6.001	SW9	3.9	1.020	0.455	0.0231	
15 minute summer	SW8	1.004	SW5	17.7	1.007	0.998	0.0666	
15 minute summer	SW9	2.004	SW5	17.4	1.021	0.979	0.0819	
1440 minute summer	Soakaway	Infiltration		0.5				81.0

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	RE1	1140	44.110	0.359	0.4	0.0784	0.0000	FLOOD RISK
1440 minute summer	SW1	1140	44.110	0.497	0.4	0.0789	0.0000	FLOOD RISK
1440 minute summer	SW2	1140	44.110	0.679	0.8	0.1581	0.0000	SURCHARGED
15 minute summer	RE2	12	44.117	0.267	5.0	0.0689	0.0000	FLOOD RISK
1440 minute summer	SW3	1140	44.110	0.320	0.4	0.0510	0.0000	FLOOD RISK
1440 minute summer	SW4	1140	44.110	0.548	1.0	0.1366	0.0000	SURCHARGED
1440 minute summer	SW5	1140	44.109	0.934	5.1	0.9336	0.0000	SURCHARGED
1440 minute summer	Gully 3	1140	44.110	0.109	0.2	0.0129	0.0000	SURCHARGED
15 minute summer	Gully 2	10	44.489	0.139	9.1	0.0533	0.0000	SURCHARGED
15 minute summer	Gully 1	10	44.538	0.138	9.1	0.0528	0.0000	SURCHARGED
15 minute summer	ACO channel 1	10	44.539	0.139	9.1	0.0638	0.0000	SURCHARGED
15 minute summer	ACO channel 2	10	44.360	0.060	5.0	0.0154	0.0000	OK
1440 minute summer	SW8	1140	44.110	0.747	2.2	0.6465	0.0000	SURCHARGED
1440 minute summer	SW9	1140	44.110	0.624	2.1	0.5408	0.0000	SURCHARGED
1440 minute summer	Soakaway	1140	44.109	0.959	5.1	73.2545	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 summer	RE1	1.001	SW1	0.4	0.434	0.066	0.0678	
1440 minute summer	SW1	1.002	SW2	0.4	0.319	0.023	0.3201	
1440 minute summer	SW2	1.003	SW8	0.8	0.321	0.045	0.1189	
15 minute summer	RE2	2.001	SW3	4.7	0.799	0.787	0.0478	
1440 minute summer	SW3	2.002	SW4	0.4	0.435	0.066	0.1395	
1440 minute summer	SW4	2.003	SW9	1.0	0.389	0.056	0.1335	
1440 minute summer	SW5	1.005	Soakaway	5.1	0.642	0.436	0.1001	
1440 minute summer	Gully 3	3.001	SW4	0.2	0.732	0.011	0.0374	
15 minute summer	Gully 2	7.001	SW9	8.9	1.143	1.043	0.0289	
15 minute summer	Gully 1	5.001	SW8	9.0	1.156	1.054	0.0170	
15 minute summer	ACO channel 1	4.001	SW8	8.9	1.143	1.042	0.0298	
15 minute summer	ACO channel 2	6.001	SW9	5.0	1.078	0.583	0.0280	
1440 minute summer	SW8	1.004	SW5	2.2	0.656	0.124	0.0666	
1440 minute summer	SW9	2.004	SW5	2.1	0.649	0.118	0.0819	
1440 minute summer	Soakaway	Infiltration		0.6				91.7

Water Quality (TSS)

Node	Treatment	Effectiveness	SuDS Component	Mitigation TSS	Cumulative TSS
Soakaway	Soakaway	1.0	Bioretention System	0.800	0.000

Water Quality (Metals)

Node	Treatment	Effectiveness	SuDS Component	Mitigation Metals	Cumulative Metals
Soakaway	Soakaway	1.0	Bioretention System	0.800	0.000

Water Quality (Hydrocarbons)

Node	Treatment	Effectiveness	SuDS Component	Mitigation Hydrocarbons	Cumulative Hydrocarbons
Soakaway	Soakaway	1.0	Bioretention System	0.800	0.000

Flow+ v18.0 Copyright © 1988-2026 Causeway Technologies Ltd

Design guidance

Hydraulic design

All AquaCell units have identical dimensions: 1m x 0.4m x 0.5m, have a nominal void ratio of 95% and each holds 190 litres of water. Hydraulic calculations are accordingly the same for AquaCell Eco, Core-R and Plus-R.

Structural design however, requires careful consideration of loading factors specific to each location – see CIRIA C680 or CIRIA C737 for further guidance (we recommend using the BPF Guide Designing Geocellular Drainage Systems to CIRIA Report C737 alongside.)

Structural design – installation and cover depths

Each AquaCell unit has been designed to have specific loading capacities (see pages 8-10) that define the maximum depth parameters for which they are suitable.

Minimum depth of cover varies according to whether or not the installation will be subject to trafficking by cars/HGVs.

However, in some situations, installations may have to be located with greater cover depths. Reasons may include:

- Deep-running drainage network
- Other buried services running above tank location
- Installation into banked/ sloping ground
- Upper layer of clay preventing infiltration

The table shows a summary of typical cover depths and installation depths as a guide.

Typical minimum cover depths and maximum installation depths

Location type	Minimum cover depths (m)		
	AquaCell Eco	AquaCell Core-R	AquaCell Plus-R
Landscaped/non-trafficked areas[2]	0.30	0.30	0.30
Car parks, vehicle mass up to 9 tonnes[1]	n/a	0.60	0.69
HA/HGV loading up to 60 tonnes	n/a	1.11	1.30
	Maximum installation depths (m)[3]		
Maximum depth to base of unit (Landscaped)	2.68	6.68	7.82
Maximum depth to base of unit – vehicle mass up to 9 tonnes	n/a	6.43	7.57
Maximum depth to base of unit – vehicle mass up to 44 tonnes	n/a	6.18	7.30

(1) For specific advice on cover depths for heavier loadings/HGV applications, contact Wavin Technical Design on 0844 856 5165.
(2) 0.30m is minimum depth for AquaCell in landscaped applications. 0.5m cover is recommended in applications where ride-on mowers may be used. If construction plant is to be used on site, extra protection may be needed.
(3) Allowable maximum depth to base of bottom layer of units is dependent on soil type, angle of shearing resistance, loadings, and groundwater level. The above depths are based on 38° angle of shearing resistance and no groundwater.

In trafficked applications it is recommended that the height of any tank should not exceed 2m (5 units). If you require a tank that exceeds this, please contact Wavin Technical Design for guidance:

T: 0844 856 5165 E: technical.design@wavin.co.uk

Job Title: Greyfriars Lane, Storrington

Job No: MCE00609 Date: 07/09/2026

Made By: JAM Checked By: Sheet No: Foul Water Drainage Design - 1

McNab Consulting Engineers

The discharge from each internal svp/soil stack was calculated, using the domestic frequency factor.
Resulting flows were then checked within each below ground pipe situated within the building footprint and main branches around the perimeter to the discharge manhole FW8.
At this stage, it is not considered feasible to reuse the existing drainage system, due to impracticable positioning relative to the new building position and due to the gradients that are required within the new system. A new foul drainage layout has therefore been shown on the drawings.

An assessment of the flow from the existing Lawn Tennis Club (which will remain) has been made, to include this flow within the existing pipe receiving discharge from manhole FW8.
This pipe is assumed to discharge into the existing Southern Water manhole reference 5002, as shown on their asset plan.

FW1 to FW2 (takes SVP-3)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	0	0
shower	0.4	0	0
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	3	3.9
dishwasher	0.2	3	0.6
washing machine	1.2	3	3.6
WC	1.7	0	0

Total DU	8.1
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.423

FW2 to FW3 (takes FW1 & SVP-4)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	1	0.3
shower	0.4	1	0.4
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	3	3.9
dishwasher	0.2	3	0.6
washing machine	1.2	3	3.6
WC	1.7	1	1.7

Total DU	10.5
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.620

FW3 to FW4 (takes FW2 & SVP-8)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	2	0.6
shower	0.4	1	0.4
urinal	0.4	0	0
bath	1.3	1	1.3
kitchen sink	1.3	6	7.8
dishwasher	0.2	6	1.2
washing machine	1.2	6	7.2
WC	1.7	2	3.4

Total DU	21.9
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	2.340

FW5 to FW8 (takes FW4 & SVP-6)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	7	2.1
shower	0.4	3	1.2
urinal	0.4	0	0
bath	1.3	4	5.2
kitchen sink	1.3	6	7.8
dishwasher	0.2	6	1.2
washing machine	1.2	6	7.2
WC	1.7	7	11.9

Total DU	36.6
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	3.025

FW6 to FW7 (takes SVP-1, 2 & 9)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	6	1.8
shower	0.4	4	1.6
urinal	0.4	0	0
bath	1.3	2	2.6
kitchen sink	1.3	2	2.6
dishwasher	0.2	2	0.4
washing machine	1.2	2	2.4
WC	1.7	6	10.2

Total DU	21.6
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	2.324

Ground floor SVP-1 (takes 1st floor SVP-1)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	3	0.9
shower	0.4	3	1.2
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	0	0
dishwasher	0.2	0	0
washing machine	1.2	0	0
WC	1.7	3	5.1

Total DU	7.2
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.342

Ground floor SVP-2 (takes 1st floor SVP-2)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	3	0.9
shower	0.4	1	0.4
urinal	0.4	0	0
bath	1.3	2	2.6
kitchen sink	1.3	2	2.6
dishwasher	0.2	2	0.4
washing machine	1.2	2	2.4
WC	1.7	3	5.1

Total DU	14.4
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.897

Ground floor SVP-3 (takes 1st floor SVP-3)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	0	0
shower	0.4	0	0
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	3	3.9
dishwasher	0.2	3	0.6
washing machine	1.2	3	3.6
WC	1.7	0	0

Total DU	8.1
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.423

Ground floor SVP-4 (takes 1st floor SVP-4)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	1	0.3
shower	0.4	1	0.4
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	0	0
dishwasher	0.2	0	0
washing machine	1.2	0	0
WC	1.7	1	1.7

Total DU	2.4
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	0.775

Ground floor SVP-5 (takes 1st floor SVP-5)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	3	0.9
shower	0.4	3	1.2
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	0	0
dishwasher	0.2	0	0
washing machine	1.2	0	0
WC	1.7	3	5.1

Total DU	7.2
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.342

FW7 to FW8 (takes FW7 & SVP-5)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	9	2.7
shower	0.4	7	2.8
urinal	0.4	0	0
bath	1.3	2	2.6
kitchen sink	1.3	2	2.6
dishwasher	0.2	2	0.4
washing machine	1.2	2	2.4
WC	1.7	9	15.3

Total DU	28.8
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	2.683

FW8 (takes FW5 & FW7)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	16	4.8
shower	0.4	10	4
urinal	0.4	0	0
bath	1.3	6	7.8
kitchen sink	1.3	8	10.4
dishwasher	0.2	8	1.6
washing machine	1.2	8	9.6
WC	1.7	16	27.2

Total DU	65.4
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	4.044

FW8 to public sewer (takes FW8 & Tennis Club flow)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	23	6.9
shower	0.4	17	6.8
urinal	0.4	3	1.2
bath	1.3	6	7.8
kitchen sink	1.3	9	11.7
dishwasher	0.2	9	1.8
washing machine	1.2	8	9.6
WC	1.7	23	39.1

Total DU	84.9
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	4.607

Ground floor SVP-6 (takes 1st floor SVP-6, 7 & 10)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	5	1.5
shower	0.4	2	0.8
urinal	0.4	0	0
bath	1.3	3	3.9
kitchen sink	1.3	0	0
dishwasher	0.2	0	0
washing machine	1.2	0	0
WC	1.7	5	8.5

Total DU	14.7
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.917

Ground floor SVP-8 (takes 1st floor SVP-8)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	1	0.3
shower	0.4	0	0
urinal	0.4	0	0
bath	1.3	1	1.3
kitchen sink	1.3	3	3.9
dishwasher	0.2	3	0.6
washing machine	1.2	3	3.6
WC	1.7	1	1.7

Total DU	11.4
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	1.688

First floor SVP-9

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	0	0
shower	0.4	0	0
urinal	0.4	0	0
bath	1.3	0	0
kitchen sink	1.3	0	0
dishwasher	0.2	0	0
washing machine	1.2	0	0
WC	1.7	0	0

Total DU	0
Frequency factor =	0.5
Q = Frequency factor x √(Total DU)	
Q (l/s) =	0.000

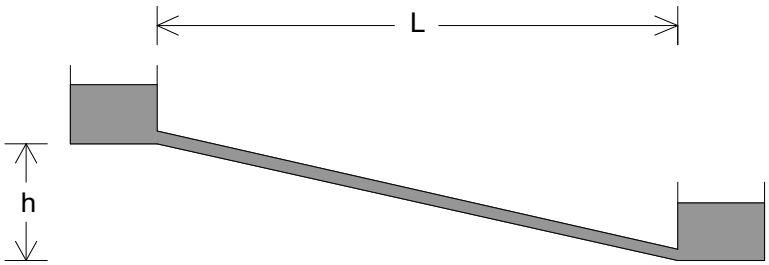
Pipe from Tennis Club (allow 3 male, 3 female & 1 disabled changing rooms & kitchen)

Appliance	Discharge Units (DU)	Quantity	Sub-total DU
wash hand basin	0.3	7	2.1
shower	0.4	7	2.8
urinal	0.4	3	1.2
bath	1.3	0	0
kitchen sink	1.3	1	1.3
dishwasher	0.2	1	0.2
washing machine	1.2	0	0
WC	1.7	7	11.9

Total DU	19.5
Frequency factor =	0.7
Q = Frequency factor x √(Total DU)	
Q (l/s) =	3.091

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.42×10^{-3}** m^3/s
Length of the sewer	L = **8.0** m
Fall along length of sewer	h = **0.182** m
Gradient of sewer	i = h / L = **0.023 (1 in 44)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **43** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.463** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **49** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.168** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.211**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **1.004** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **7.88×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.287**

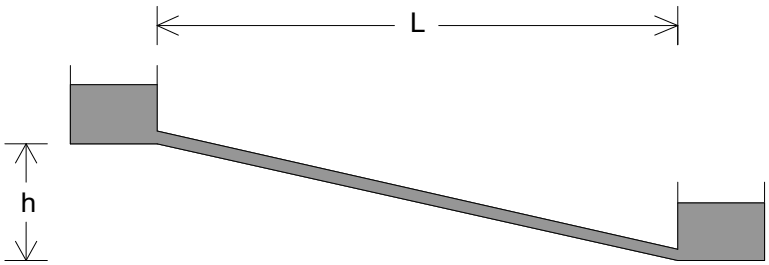
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.763** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **775.×10^{-6}** m^3/s
Length of the sewer	L = **8.1** m
Fall along length of sewer	h = **0.289** m
Gradient of sewer	i = h / L = **0.036 (1 in 28)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **31** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.832** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **36** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.463** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.265**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **1.259** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **9.89×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.189**

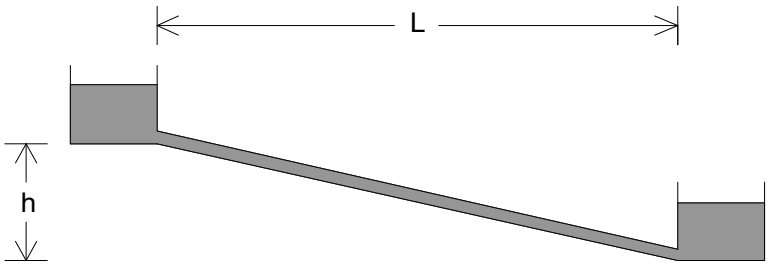
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.751** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.62×10^{-3}** m^3/s
Length of the sewer	L = **5.5** m
Fall along length of sewer	h = **0.112** m
Gradient of sewer	i = h / L = **0.020 (1 in 49)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **47** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.384** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **53** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.105** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.200**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.949** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **7.46×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.315**

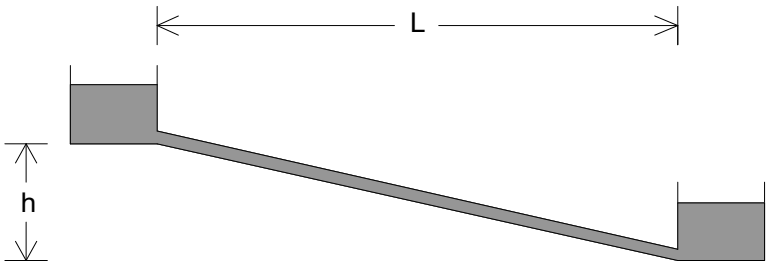
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.759** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.69×10^{-3}** m^3/s
Length of the sewer	L = **5.5** m
Fall along length of sewer	h = **0.108** m
Gradient of sewer	i = h / L = **0.020 (1 in 51)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **48** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.359** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **54** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.085** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.196**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.932** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **7.32×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.325**

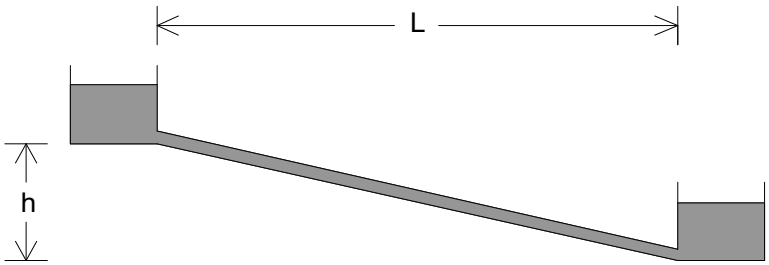
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.757** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **2.34×10^{-3}** m^3/s
Length of the sewer	L = **17.5** m
Fall along length of sewer	h = **0.265** m
Gradient of sewer	i = h / L = **0.015 (1 in 66)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **57** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.194** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **64** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **0.953** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.172**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.818** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **6.42×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.417**

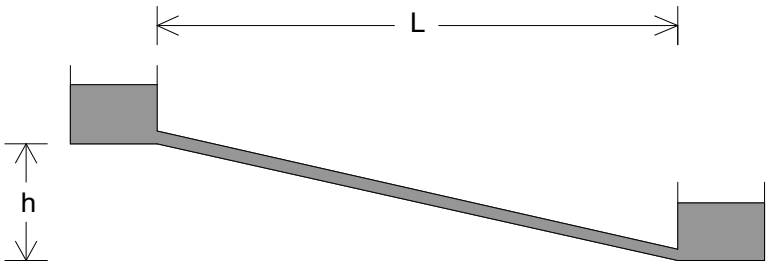
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.753** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.92×10^{-3}** m^3/s
Length of the sewer	L = **7.3** m
Fall along length of sewer	h = **0.128** m
Gradient of sewer	i = h / L = **0.018 (1 in 57)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **51** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.284** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **58** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.025** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.185**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.880** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **6.91×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.359**

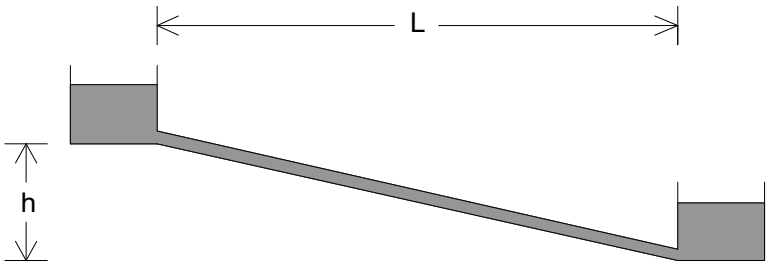
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.754** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate Q_{design} = **3.02×10^{-3}** m^3/s

Length of the sewer L = **5.6** m

Fall along length of sewer h = **0.072** m

Gradient of sewer i = h / L = **0.013 (1 in 78)**

(Library item Sewer design details)

Minimum flow velocity V_{min} = **0.750** m/s

Minimum pipe diameter D_{min} = **100** mm

Surface roughness k_s = **1.5** mm

Mean hydraulic depth factor m = **0.30**

Kinematic viscosity of fluid ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant c = 56

Diameter of pipe required $D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **66** mm

Nearest pipe diameter D_{chezy} = **100** mm

Flow velocity using Chezy $V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.100** m/s

Using the Escritt equation

Diameter of pipe required $D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **73** mm

Nearest pipe diameter $D_{escritt}$ = **100** mm

Flow velocity using Escritt $V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1\ m/s / (\sqrt{(1 / i)} \times 60)$ = **0.878** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter $D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm

Constant $Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.159**

Flow velocity $V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$

V_{full} = **0.753** m/s

Flow rate running full $Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **5.91×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D x = **0.507**

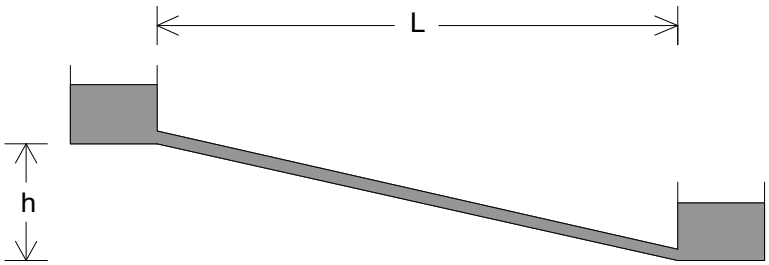
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate V_{design} = **0.757** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.34×10^{-3}** m^3/s
Length of the sewer	L = **7.0** m
Fall along length of sewer	h = **0.163** m
Gradient of sewer	i = h / L = **0.023 (1 in 43)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **42** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.480** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **48** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.182** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.214**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **1.016** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **7.98×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.277**

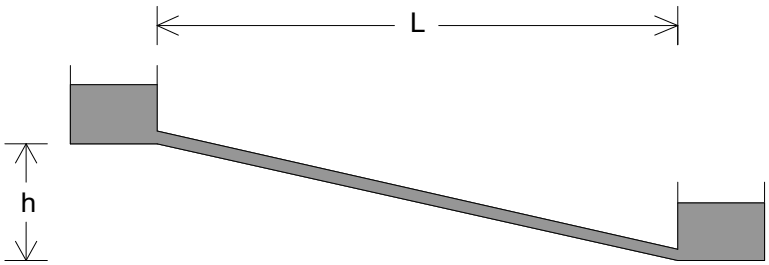
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.757** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.90×10^{-3}** m^3/s
Length of the sewer	L = **3.7** m
Fall along length of sewer	h = **0.066** m
Gradient of sewer	i = h / L = **0.018 (1 in 56)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **51** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.295** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **58** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.034** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.187**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.888** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **6.97×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.355**

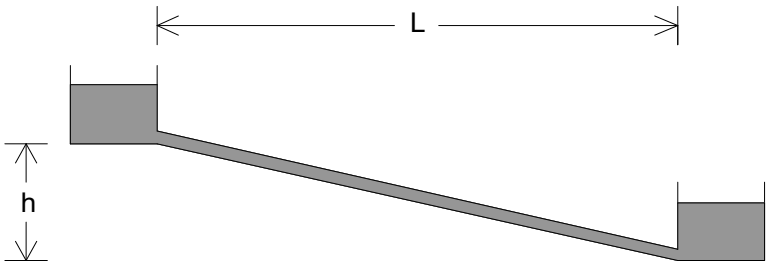
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.757** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **2.32×10^{-3}** m^3/s
Length of the sewer	L = **5.2** m
Fall along length of sewer	h = **0.080** m
Gradient of sewer	i = h / L = **0.015 (1 in 65)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **57** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.203** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **64** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **0.961** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.174**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.824** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **6.47×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.413**

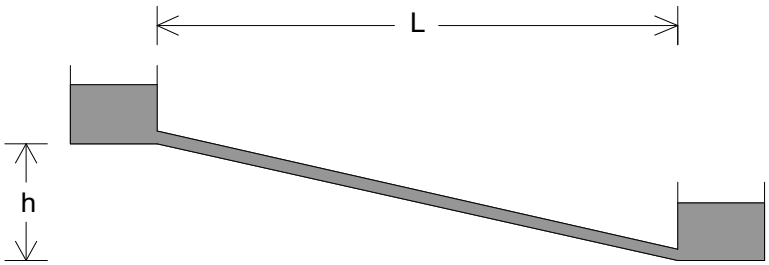
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.756** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **1.34×10^{-3}** m^3/s
Length of the sewer	L = **5.2** m
Fall along length of sewer	h = **0.121** m
Gradient of sewer	i = h / L = **0.023 (1 in 43)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **42** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.480** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **48** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **1.181** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.214**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **1.015** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **7.97×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.277**

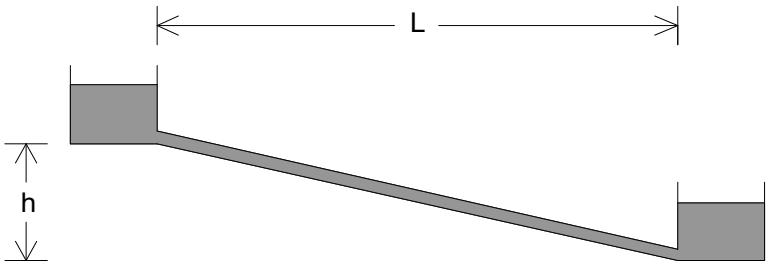
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.756** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **2.68×10^{-3}** m^3/s
Length of the sewer	L = **8.3** m
Fall along length of sewer	h = **0.115** m
Gradient of sewer	i = h / L = **0.014 (1 in 72)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **62** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.142** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **69** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **0.912** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.165**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.782** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **6.14×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.462**

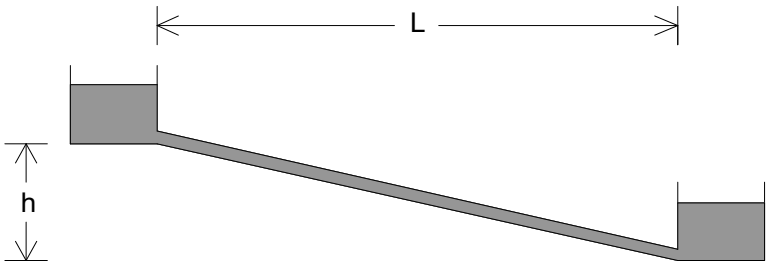
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.755** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **3.09×10^{-3}** m^3/s
Length of the sewer	L = **54.0** m
Fall along length of sewer	h = **0.675** m
Gradient of sewer	i = h / L = **0.013 (1 in 80)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **67** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.084** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **74** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **0.866** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.157**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.742** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **5.83×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.518**

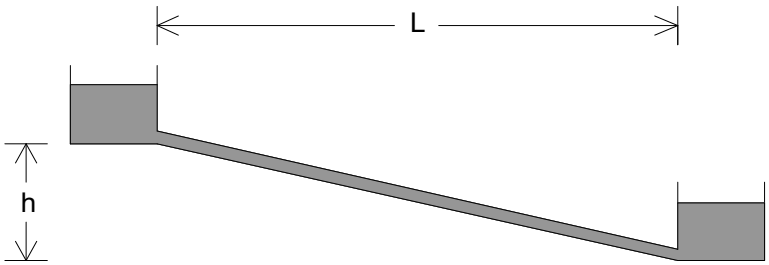
PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.752** m/s

PASS - Design velocity is greater than 0.750 m/s

DESIGN OF A FOUL SEWER

TEDDS calculation version 1.0.04



Design pipe flow limited to 0.75 times full depth

Sewer design details

Design flow rate	Q_{design} = **4.61×10^{-3}** m^3/s
Length of the sewer	L = **30.0** m
Fall along length of sewer	h = **0.334** m
Gradient of sewer	i = h / L = **0.011 (1 in 90)**

(Library item Sewer design details)

Minimum flow velocity	V_{min} = **0.750** m/s
Minimum pipe diameter	D_{min} = **100** mm
Surface roughness	k_s = **1.5** mm
Mean hydraulic depth factor	m = **0.30**
Kinematic viscosity of fluid	ν = **1.31×10^{-6}** m^2/s

Using the Chezy equation

Constant	c = 56
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2}$ = **80** mm
Nearest pipe diameter	D_{chezy} = **100** mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)}$ = **1.023** m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035\ m^3/s)^{0.382} \times 1mm$ = **88** mm
Nearest pipe diameter	$D_{escritt}$ = **100** mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1$ m/s / $(\sqrt{(1 / i)} \times 60)$ = **0.817** m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = max(D_{chezy}, D_{escritt}, D_{min})$ = **100** mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} / 1000mm) \times i)}$ = **0.148**
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	V_{full} = **0.700** m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4$ = **5.49×10^{-3}** m^3/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	x = **0.702**

PASS - Design pipe flow less than 0.75 times full depth

Flow velocity at design flow rate	V_{design} = **0.782** m/s

PASS - Design velocity is greater than 0.750 m/s