KAVANAGH BURKE
CONSULTING ENGINEERS

Drainage Design Report

for

Infill Housing Scheme

at

**Manor Avenue,
Wainsfort Grove,
Dublin 6**

Job No:	**D1606-1**
Client:	**Sal Le Bas**
Date:	**07th September 2022**
Local Authority:	**South Dublin County Council**
Revision:	**Planning**
	PL1

INTRODUCTION

This report details the site development works design for a residential development at Manor Avenue, Wainsfort, Dublin 6 – planning issue.

The land of the proposed development is bounded on all sides by residential properties. The development comprises 3 no. dwellings in total.

The site will be serviced primarily through connection to the existing services in the area.

The provision of the new on-site foul sewer, surface water & watermain are described as follows with calculations appended.

1. Surface Water:

Runoff generated from hardstanding areas on site will be collected by rainwater goods and directed to an on-site surface water "Stormtech" or similar underground attenuation tank, thus surface water attenuation is proposed for this previously unattenuated brown field site. The underground tank is designed to attenuate 1 in 30-year storm event of any duration; therefore, no flooding will occur on site for any duration events up to 30-year return period as per "Greater Dublin Strategic Drainage Study" (GDSDS) requirements.

In addition to providing attenuation volume, temporary flood storage is checked and provided where needed (as an integrated part of the attenuation system) for 100-year return events as per GDSDS requirements. The restricted discharge from site will be limited by a proprietary flow control device. The maximum allowable discharge is limited to calculated flow (calculated for overall site, see calculations in the succeeding chapters) not exceeding Greenfield runoff rate, QBAR (as per criterion 4.3 "River Flood Protection" chapter 6.3.4 of GDSDS). All flows and runoffs for storm water network design and attenuation sizing are calculated incorporating 20% climate change factor for all rainfall intensities as per chapter 6.3.2.4 of GDSDS table 6.2 "Climate Change Factors". In addition, a computer analysis in the storm network modelling software was performed to confirm the sizing of the pipe network and underground attenuation storage for 1 in 100-year storms of all durations. This analysis includes a specific model of vortex flow control device with discharge of the calculated QBAR and 20% Climate Change Factor. The analysis indicated no on-site flooding (meaning that both the network and all proposed attenuation storage have sufficient capacities).

To allow for maintenance of the "Stormtech" attenuation system, an access manhole is provided at each end of the isolator (inlet) row of the attenuation storage cells for jetting out any possible debris in the unlikely event of such debris passing through the proposed trapped gullies. In addition, A proprietary Petrol Interceptor will be provided on the inlet to the proposed attenuation to improve the quality of the discharge by capturing all possible hydrocarbons pollution from the proposed development.

An "hydrobrake" or equivalent flow control device provided on the outfall pipe of the attenuation tank is designed to control the flow to 2 l/sec as described in this report. The value of 2 l/sec is the practical minimum for an orifice size within a proprietary vortex flow control device. Numerous flow control device manufacturers have advised us on this issue.

In summary, all private storm drainage will be connected through the private collector pipe located in the rear gardens of the proposed dwellings. Runoff from the carparking and manoeuvring area will also flow to this collector pipe, that will discharge to the "Stormtech" underground attenuation tank. A flow control device will be placed at the outlet of the manhole MH S03 to ensure the flow restriction to QBAR for 1 in 30-year storms. For a 1 in 100-year storms plus 20% Climate Change Factor, the High-Water Level satisfy a minimum freeboard of 500 mm from the lowest Finished Floor Level, as shown on enclosed drawing ref. *D1606-1-KB-XX-XX-C-0001-Drainage & Watermain Layout_rev.*PL1.

To minimise surface water runoff from the site, in addition to the proposed landscaped areas, green roof on all houses, permeable paving at the site entrance, and grasscrete to all carparking spaces are proposed as SuDS devices to promote infiltration / to reduce the amount of runoff generated. Specifically, greens roofs are proposed for interception storage for 5 mm and smaller rainfall events:

- Max Water Storage Capacity in the substrate of these equal: 259 m^2 x 50 mm x 35% = 4.5 m^3

In considering the above surface water management solution, consideration was given to the other SuDS devices therefore the following measures will be installed:

- Tree Pits.
- Water butts.
- Trapped Road Gullies.
- Green roof (to all house roofs for interception storage)
- Permeable paving.
- Grasscrete (to all carparking spaces).
- Petrol interceptor (to the inlet of the attenuation tank for pollution prevention).
- Restricted discharge (to the outfall pipe of the attenuation tank for regional control).

The network calculations demonstrating pipes capacities and achieved velocities are included in the Appendix A of this drainage report.

2. <u>Foul Sewer:</u>

A new foul sewer has been designed to collect the combined discharge of the proposed dwellings and one of the existing properties, and discharge to an existing foul sewer manhole located at Wainsfort Grove. Connection to the existing foul sewer network is proposed at an existing manhole at the junction of Wainsfort Grove and Manor Avenue, the exact connection location and discharge route is shown on accompanying drawing reference *D1606-1-KB-XX-XX-C-0001-Drainage & Watermain Layout_rev.*PL1.

An average of 6 discharge units per dwelling/apartment/office is used in the design of the network (as per EN-752) thus resulting in 24 discharge units. The proposed foul sewer network complies with the Table: Sewer Size/Gradient for Multiple Properties in section 3.6 of Irish Water Code of Practice for Wastewater Infrastructure.

The proposed foul sewer including manholes and service connections will be constructed in compliance with design standards set out by Irish Water in the IW Code of Practice for Wastewater Infrastructure and Wastewater Infrastructure Standard Details, as shown on *D1606-1-KB-XX-XX-C-0001-Drainage & Watermain Layout_rev.*PL1.

The network calculations demonstrating pipes capacities and achieved velocities are included in the Appendix B of this drainage report.

3. Watermain:

The watermain proposed to serve the development will form connection from the existing Local Authority watermain at Wainsfort Grove, the exact connection location is shown on accompanying drawing reference *D1606-1-KB-XX-XX-C-0001-Drainage & Watermain Layout_rev.*PL1.

A new 100mm diameter watermain within the site will be provided with adequate sluice valves, water meter & fire hydrants to provide water supply and for firefighting purposes. Hydrants for firefighting purposes will not be placed within 6m of a building or structure and at a maximum 46m from proposed buildings.

All associated details including watermain pipe material will be in accordance with the current Irish Water guidelines. Guidelines set out in the Irish Water Publications IW-CDS_5020-1 & IW-CDS-5030-1 have been consulted and adopted within the design of the proposed drainage & watermain networks. Refer to enclosed drawing reference *D1606-1-KB-XX-XX-C-0001-Drainage & Watermain Layout_rev.*PL1 for details.

4. Surface Water Attenuation Calculation

1) Areas for Attenuation Calculation

Site Area:	1,328 m^2 (0.133 ha)
Overall landscaping:	291 m^2
Contributing Landscaping:	291 m^2
Impermeable Areas (roofs, roads, permeable paving, footpaths):	1,037 m^2

2) Interception Storage

Calculate runoff from 5mm of rainfall on developed area.

For this calculation only hardstanding areas are assumed to provide 100% runoff, and non-hardstanding areas are assumed to provide 30% runoff.

The equivalent volume of Interception Storage should be provided on site as no discharge from site should occur for this initial 5mm depth of rainfall. The Interception Storage on this subject site will be provided through the base of attenuation tank.

Design Impermeable Areas: 1,037 m^2 x 1.00 + 291 m^2 x 0.30 = 1,124 m^2

Total volume for 5mm rainfall: 5mm x 1,124 m^2 = **5.7 m^3**

Therefore, a minimum Interception Storage volume of 5.7 m^3 should be provided. This will prevent discharge from site during rainfall events of up to 5mm rainfall.

3) Greenfield Runoff Rate – QBAR, (mean annual flood flow):

$Q_{BARrural}$ (m^3/sec) = 0.00108 x $AREA^{0.89}$ x $SAAR^{1.17}$ x $SOIL^{2.17}$

SAAR (E 323030, N 225640): 752 mm (*as per Met Eireann data*)

Soil Index:
S1 (very low runoff)
S2
S3 (moderate runoff)
S4
S5 (very high runoff)

Soil = 0.1($Soil_1$) + 0.3($Soil_2$) + 0.37($Soil_3$) + 0.47($Soil_4$) + 0.53($Soil_5$)

As the site is relatively small in catchment terms the soil class will be 100% Soil2 as per online Wallingford Procedure Greenfield runoff estimation tool on www.uksuds.com (see Appendix to Surface Water Design for the HR Wallingford Greenfield runoff rate estimation report).

Soil Class:	$Soil_2$
Runoff Potential:	Moderate
Soil Value:	0.30

Q_{BAR}:

As the site area is less than 50 hectares, QBAR for 50 hectares is firstly calculated:

Q_{BAR} (m^3/sec) = 0.00108 x $AREA^{0.89}$ x $SAAR^{1.17}$ x $SOIL^{2.17}$ =
0.00108 x $(0.13)^{0.89}$ x $(752)^{1.17}$ x $(0.3)^{2.17}$ =
99.1 l/sec =
1.98 l/sec/ha

Q_{BAR} for the subject site area:

1.98 l/sec/ha x 0.13ha =

Q_{BAR} = 0.26 l/sec

According to GDSDS chapter 6.3.1.4 if the separate long-term storage cannot be provided and temporary flood storage forms part of the single attenuation system, all the runoff from the site should be discharged at either a rate of 2.0 l/s/ha or the average annual peak flow rate Q_{BAR}, whichever is greater:

2 l/sec/ha x 0.13 ha = 0.27 l/sec.

Minimum achievable hydrobrake flow rate is 2 l/sec.

Therefore, allowable discharge (Q_{BAR}) will be set at **2.00 l/sec.**

4) Attenuation Storage Volume

100% of hardstand areas and 30% of landscaping areas are assumed to contribute.

Permeable paving taken as impervious surfacing for attenuation storage calculations to allow for long term paving infiltration rate reduction.

Equivalent Runoff Area: 100% x 1,037 m^2 + 30% x 291 m^2 = 1,124 m^2

Met Eireann's Rainfall depths for the 30-year storm event have been used. The table below identified the 2-hour event as the critical event. The rainfall depth used includes a 20% allowance for climate change giving a volume of 37 m^3 - (Column G).

A	B	C	D	E	F	G
Duration	**Runoff Area** (m²)	**Total Rainfall Depth** (mm)	**Revised Depth for 20% Climate Change** (mm) C x 1.2	**Total Surface Water** (m³) B x D	**Total Permitted Discharge** (m³) Q2 x A *(Q_{BAR}=5.25 l/sec)*	**Storage Volume Required** (m³) E - F
15 min	1124	19.2	23.0	26	1	25
30 min	1124	24.1	28.9	33	3	30
1 hour	1124	30.2	36.2	41	7	34
2 hours	**1124**	**37.8**	**45.4**	**51**	**14**	**37**
4 hours	1124	47.3	56.8	64	28	36
6 hours	1124	54.0	64.8	73	43	30
9 hours	1124	61.6	73.9	84	64	20
12 hours	1124	67.6	81.1	92	86	6
18 hours	1124	77.1	92.5	105	129	-24
1 day	1124	84.6	101.5	115	172	-57
2 days	1124	96.6	115.9	131	345	-214
3 days	1124	106.5	127.8	144	518	-374

Critical Attenuation Volume = 37 m^3

The calculated attenuation storage volume was analysed in the storm water network modelling software using the site-specific vortex type flow control device and there was no indication of flood or ponding for any storm duration for 1 in 30-year return period including 20% CCF therefore calculated volume of attenuation tank is sufficient.

The detailed results of this analysis are enclosed in this report at Surface Water Network Design.

5) Temporary Flood Storage

In addition to the previous calculations for interception & attenuation storage, the temporary flood storage must be calculated.

For long term storage the GDSDS runoff model assumptions:

- 100% of hardstand areas are assumed to contribute.
- Soil SPR Value – 0.3, therefore 30% of non-hardstand areas assumed to contribute.

Equivalent Runoff Area: 100% x 1,037 m^2 + 30% x 291 m^2 =
= 1,037 m^2 + 87 m^2 =
= **1,124 m^2**

The 6-hour duration, 100-year return period must be checked to assess the **temporary flood storage** required for the site.

100 years 6-hour event, rainfall depth: 73.0 mm
Factor up by 20% for climate change: 87.6 mm

Total Volume of Runoff:	87.6m x 1,124 m^2	=	82 m^3
Deduct discharge at Q_{BAR} for 6hrs:	2.0 l/sec x 6 hrs	=	43 m^3
Storage volume required:	82 – 43	=	39 m^3
Deduct Attenuation Storage:	37 m^3		
Temporary Flood Storage required:	39 – 37	=	2 m^3

The calculated attenuation volume was analysed in a storm water network modelling software using the site-specific vortex type flow control device and there was no indication of flood or ponding for any storm duration for 1 in 100 year storms with 20% CCF and there is no flooding or ponding during the analysis.

The detailed results of this analysis are enclosed in this report at Surface Water Network Design.

In summary:

INTERCEPTION STORAGE: 5.7 m^3 to be provided by green roofs and landscaped areas.

ATTENUATION VOLUME: 37 m^3 to be provided within the attenuation system on site.

TEMPORARY FLOOD STORAGE: 2 m^3 to be provided within the attenuation system on site.

ATTENUATION VOLUME REQUIRED: 39 m^3

ATTENUATION VOLUME PROVIDED: 41 m^3

Storm Water Network analysis and Attenuation Tank Size checks were performed using a computer hydraulic analysis software. The analysis did not highlight any ponding for any storm durations up to 1:100y return therefore the network and attenuation capacity calculated above are satisfactory.
The results of the analysis are included in this report.

Project: **Wainsfort Grove**

StormTech
Detention • Retention • Water Quality
A division of ADS

Chamber Model -	SC-740	
Units -	**Metric**	Click Here for Imperial
Number of chambers -	17	
Voids in the stone (porosity) -	43	%
Base of Stone Elevation -	47.77	m
Amount of Stone Above Chambers -	160	mm
Amount of Stone Below Chambers -	160	mm
Area of system -	95	sq.meters

☑ Include Perimeter Stone in Calculations

Min. Area - 53.389 sq.meters

StormTech SC-740 Cumulative Storage Volumes

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
1067	0.00	0.00	1.04	1.04	56.206	48.84
1041	0.00	0.00	1.04	1.04	55.167	48.81
1016	0.00	0.00	1.04	1.04	54.129	48.79
991	0.00	0.00	1.04	1.04	53.091	48.76
965	0.00	0.00	1.04	1.04	52.053	48.74
940	0.00	0.00	1.04	1.04	51.015	48.71
914	0.00	0.03	1.03	1.05	49.977	48.68
889	0.00	0.08	1.00	1.08	48.924	48.66
864	0.01	0.14	0.98	1.12	47.842	48.63
838	0.02	0.29	0.91	1.20	46.726	48.61
813	0.02	0.39	0.87	1.26	45.522	48.58
787	0.03	0.46	0.84	1.30	44.264	48.56
762	0.03	0.52	0.82	1.33	42.965	48.53
737	0.03	0.57	0.79	1.36	41.633	48.51
711	0.04	0.61	0.78	1.39	40.271	48.48
686	0.04	0.65	0.76	1.41	38.885	48.46
660	0.04	0.70	0.74	1.44	37.476	48.43
635	0.04	0.73	0.72	1.46	36.039	48.41
610	0.04	0.76	0.71	1.47	34.582	48.38
584	0.05	0.79	0.70	1.49	33.110	48.35
559	0.05	0.82	0.69	1.50	31.621	48.33
533	0.05	0.84	0.68	1.52	30.117	48.30
508	0.05	0.87	0.66	1.53	28.598	48.28
483	0.05	0.89	0.65	1.55	27.065	48.25
457	0.05	0.91	0.65	1.56	25.518	48.23
432	0.05	0.93	0.64	1.57	23.961	48.20
406	0.06	0.95	0.63	1.58	22.392	48.18
381	0.06	0.97	0.62	1.59	20.812	48.15
356	0.06	0.98	0.61	1.60	19.223	48.13
330	0.06	1.00	0.61	1.61	17.623	48.10
305	0.06	1.01	0.60	1.62	16.016	48.07
279	0.06	1.03	0.60	1.62	14.400	48.05
254	0.06	1.04	0.59	1.63	12.777	48.02
229	0.06	1.05	0.59	1.64	11.148	48.00
203	0.06	1.06	0.58	1.64	9.513	47.97
178	0.06	1.06	0.58	1.64	7.872	47.95
152	0.00	0.00	1.04	1.04	6.228	47.92
127	0.00	0.00	1.04	1.04	5.190	47.90
102	0.00	0.00	1.04	1.04	4.152	47.87
76	0.00	0.00	1.04	1.04	3.114	47.85
51	0.00	0.00	1.04	1.04	2.076	47.82
25	0.00	0.00	1.04	1.04	1.038	47.80

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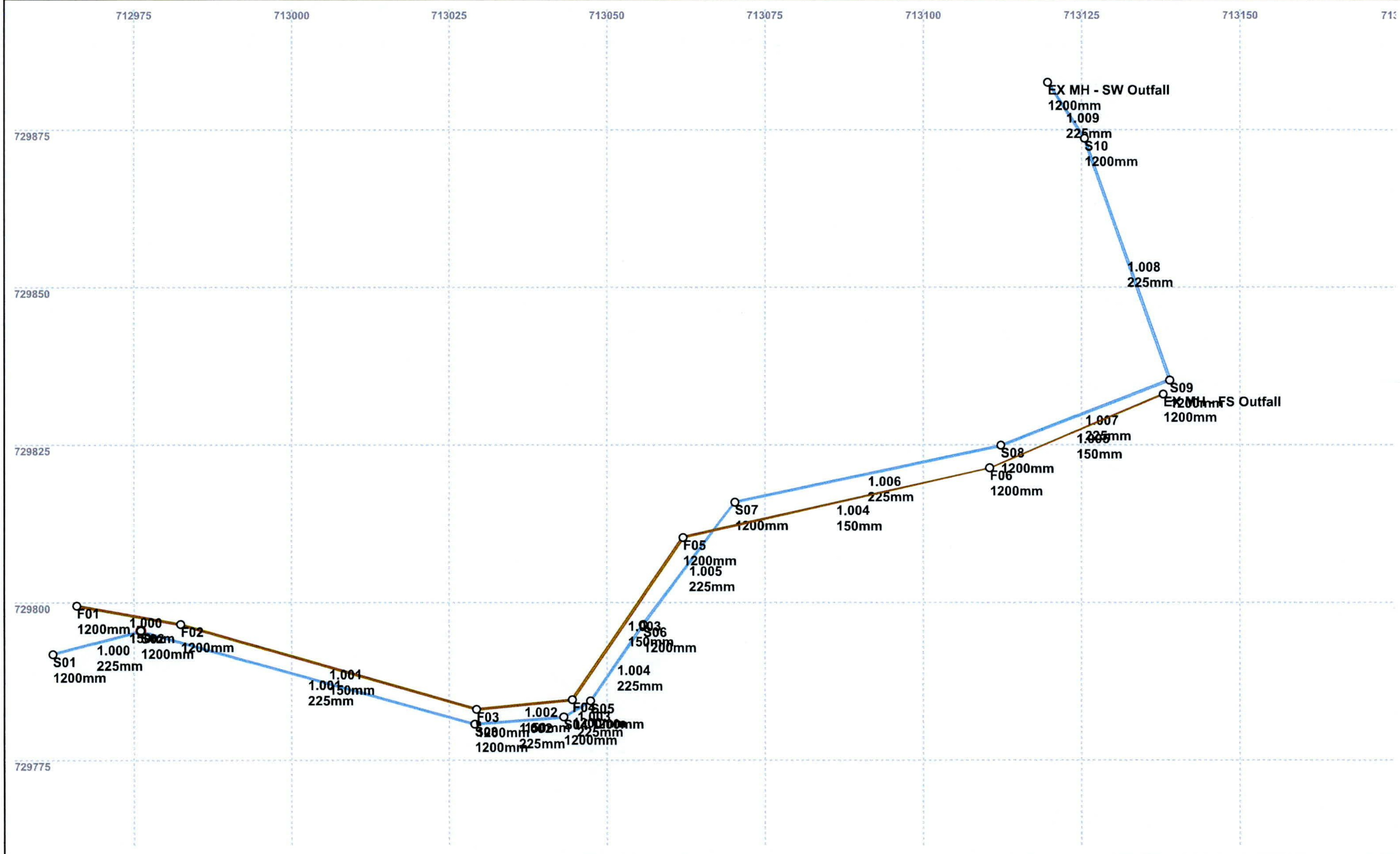
APPENDIX A

Surface Water & Foul Sewer Networks Scheme
Surface Water Network Design

KAVANAGH BURKE CONSULTING ENGINEERS	Kavanagh Burke Ltd Unit F3 Calmount Park Ballymount Dublin 12	File: D1606-1 SW & FS Model.pfd Network: Foul Network Pablo M Bussi 07/09/2022	Page 1 Wainsfort Grove SW & FS Networks Scheme



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	20	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	17.600	Minimum Backdrop Height (m)	0.200
Ratio-R	0.276	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S01	0.066	5.00	49.250	1200	712962.110	729791.825	1.250
S02	0.009	5.00	49.500	1200	712976.074	729795.540	1.560
S03	0.038	5.00	49.650	1200	713029.039	729780.753	1.970
S04			49.650	1200	713043.192	729781.885	2.040
S05			49.650	1200	713047.424	729784.439	2.060
S06	0.016	5.00	49.550	1200	713055.756	729796.535	2.030
S07			49.450	1200	713070.251	729815.905	2.050
S08			49.350	1200	713112.207	729824.951	2.160
S09			48.600	1200	713138.932	729835.292	1.550
S10			48.100	1200	713125.451	729873.642	1.250
EX MH - SW Outfall			48.100	1200	713119.620	729882.535	1.300

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)
1.000	S01	S02	14.450	1.500	48.000	47.950	0.050	289.0	225	5.36	50.0
1.001	S02	S03	54.990	1.500	47.940	47.680	0.260	211.5	225	6.52	47.8
1.002	S03	S04	14.198	1.500	47.680	47.610	0.070	202.8	225	6.82	46.9
1.003	S04	S05	4.943	1.500	47.610	47.590	0.020	247.1	225	6.93	46.6
1.004	S05	S06	14.688	1.500	47.590	47.520	0.070	209.8	225	7.24	45.7
1.005	S06	S07	24.193	1.500	47.520	47.400	0.120	201.6	225	7.74	44.4
1.006	S07	S08	42.920	1.500	47.400	47.190	0.210	204.4	225	8.63	42.3
1.007	S08	S09	28.656	1.500	47.190	47.050	0.140	204.7	225	9.23	41.1
1.008	S09	S10	40.650	1.500	47.050	46.850	0.200	203.3	225	10.07	39.4
1.009	S10	EX MH - SW Outfall	10.634	1.500	46.850	46.800	0.050	212.7	225	10.30	39.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Velocity (m/s)
1.000	S01	S02	0.673	26.8	10.7	1.025	1.325	1.325	0.066	0.0	0.635
1.001	S02	S03	0.788	31.3	11.6	1.335	1.745	1.745	0.075	0.0	0.728
1.002	S03	S04	0.804	32.0	17.2	1.745	1.815	1.815	0.113	0.0	0.818
1.003	S04	S05	0.728	29.0	17.1	1.815	1.835	1.835	0.113	0.0	0.758
1.004	S05	S06	0.791	31.4	16.8	1.835	1.805	1.835	0.113	0.0	0.805
1.005	S06	S07	0.807	32.1	18.6	1.805	1.825	1.825	0.129	0.0	0.835
1.006	S07	S08	0.801	31.9	17.7	1.825	1.935	1.935	0.129	0.0	0.823
1.007	S08	S09	0.801	31.8	17.2	1.935	1.325	1.935	0.129	0.0	0.817
1.008	S09	S10	0.803	31.9	16.5	1.325	1.025	1.325	0.129	0.0	0.810
1.009	S10	EX MH - SW Outfall	0.785	31.2	16.3	1.025	1.075	1.075	0.129	0.0	0.794

1.009	310	EX MH - SW Outfall	0.785	31.2	10.3	1.025	1.075		1.075	0.125	[illegible]	[illegible]

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	x
M5-60 (mm)	17.600	Drain Down Time (mins)	2880
Ratio-R	0.276	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	20	0	0
100	20	0	0

Node S03 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	47.680	Product Number	CTL-SHE-0069-2000-0860-2000
Design Depth (m)	0.860	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S02 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	47.940
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	44

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	52.7	0.0	1.067	52.7	0.0	1.068	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +20% CC 15 minute summer	252.443	71.433	30 year +20% CC 600 minute winter	16.942	6.782
30 year +20% CC 15 minute winter	177.153	71.433	30 year +20% CC 720 minute summer	22.319	5.982
30 year +20% CC 30 minute summer	172.992	48.951	30 year +20% CC 720 minute winter	15.000	5.982
30 year +20% CC 30 minute winter	121.398	48.951	30 year +20% CC 960 minute summer	18.629	4.905
30 year +20% CC 60 minute summer	120.498	31.844	30 year +20% CC 960 minute winter	12.340	4.905
30 year +20% CC 60 minute winter	80.056	31.844	30 year +20% CC 1440 minute summer	13.835	3.708
30 year +20% CC 120 minute summer	76.613	20.247	30 year +20% CC 1440 minute winter	9.298	3.708
30 year +20% CC 120 minute winter	50.900	20.247	30 year +20% CC 2160 minute summer	10.132	2.800
30 year +20% CC 180 minute summer	59.958	15.429	30 year +20% CC 2160 minute winter	6.981	2.800
30 year +20% CC 180 minute winter	38.974	15.429	30 year +20% CC 2880 minute summer	8.554	2.293
30 year +20% CC 240 minute summer	48.051	12.699	30 year +20% CC 2880 minute winter	5.749	2.293
30 year +20% CC 240 minute winter	31.924	12.699	30 year +20% CC 4320 minute summer	6.610	1.728
30 year +20% CC 360 minute summer	37.426	9.631	30 year +20% CC 4320 minute winter	4.353	1.728
30 year +20% CC 360 minute winter	24.328	9.631	30 year +20% CC 5760 minute summer	5.523	1.414
30 year +20% CC 480 minute summer	29.920	7.907	30 year +20% CC 5760 minute winter	3.574	1.414
30 year +20% CC 480 minute winter	19.878	7.907	30 year +20% CC 7200 minute summer	4.741	1.210
30 year +20% CC 600 minute summer	24.796	6.782	30 year +20% CC 7200 minute winter	3.060	1.210

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +20% CC 15 minute summer	327.924	92.791	100 year +20% CC 600 minute winter	21.183	8.480
100 year +20% CC 15 minute winter	230.122	92.791	100 year +20% CC 720 minute summer	27.812	7.454
100 year +20% CC 30 minute summer	225.859	63.910	100 year +20% CC 720 minute winter	18.691	7.454
100 year +20% CC 30 minute winter	158.497	63.910	100 year +20% CC 960 minute summer	23.088	6.080
100 year +20% CC 60 minute summer	156.285	41.301	100 year +20% CC 960 minute winter	15.294	6.080
100 year +20% CC 60 minute winter	103.832	41.301	100 year +20% CC 1440 minute summer	17.018	4.561
100 year +20% CC 120 minute summer	98.475	26.024	100 year +20% CC 1440 minute winter	11.437	4.561
100 year +20% CC 120 minute winter	65.425	26.024	100 year +20% CC 2160 minute summer	12.364	3.417
100 year +20% CC 180 minute summer	76.581	19.707	100 year +20% CC 2160 minute winter	8.520	3.417
100 year +20% CC 180 minute winter	49.780	19.707	100 year +20% CC 2880 minute summer	10.377	2.781
100 year +20% CC 240 minute summer	61.080	16.142	100 year +20% CC 2880 minute winter	6.974	2.781
100 year +20% CC 240 minute winter	40.580	16.142	100 year +20% CC 4320 minute summer	7.949	2.078
100 year +20% CC 360 minute summer	47.237	12.156	100 year +20% CC 4320 minute winter	5.234	2.078
100 year +20% CC 360 minute winter	30.705	12.156	100 year +20% CC 5760 minute summer	6.598	1.689
100 year +20% CC 480 minute summer	37.566	9.928	100 year +20% CC 5760 minute winter	4.270	1.689
100 year +20% CC 480 minute winter	24.958	9.928	100 year +20% CC 7200 minute summer	5.635	1.438
100 year +20% CC 600 minute summer	31.003	8.480	100 year +20% CC 7200 minute winter	3.637	1.438

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.41%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	S01	164	48.357	0.357	5.9	0.7803	0.0000	SURCHARGED
180 minute winter	S02	164	48.357	0.417	7.7	22.4777	0.0000	SURCHARGED
180 minute winter	S03	160	48.356	0.676	3.8	1.0259	0.0000	SURCHARGED
30 minute summer	S04	158	47.652	0.042	2.0	0.0478	0.0000	OK
15 minute winter	S05	121	47.630	0.040	2.0	0.0447	0.0000	OK
15 minute winter	S06	10	47.594	0.074	7.1	0.0954	0.0000	OK
15 minute winter	S07	11	47.473	0.073	7.0	0.0830	0.0000	OK
15 minute winter	S08	12	47.263	0.073	7.0	0.0829	0.0000	OK
15 minute winter	S09	13	47.122	0.072	6.9	0.0812	0.0000	OK
15 minute winter	S10	14	46.924	0.074	6.9	0.0840	0.0000	OK
15 minute winter	EX MH - SW Outfall	14	46.867	0.067	6.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	S01	1.000	S02	5.5	0.498	0.204	0.5747	
180 minute winter	S02	1.001	S03	2.2	0.140	0.070	2.1870	
180 minute winter	S03	Hydro-Brake®	S04	2.0				
30 minute summer	S04	1.003	S05	2.0	0.416	0.069	0.0243	
15 minute winter	S05	1.004	S06	2.0	0.435	0.064	0.1161	
15 minute winter	S06	1.005	S07	7.0	0.633	0.219	0.2708	
15 minute winter	S07	1.006	S08	7.0	0.635	0.220	0.4745	
15 minute winter	S08	1.007	S09	6.9	0.632	0.218	0.3152	
15 minute winter	S09	1.008	S10	6.9	0.625	0.216	0.4525	
15 minute winter	S10	1.009	EX MH - SW Outfall	6.7	0.635	0.216	0.1128	19.2

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.41%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	S01	172	48.543	0.543	7.6	1.1871	0.0000	SURCHARGED
180 minute winter	S02	172	48.543	0.603	10.6	32.5099	0.0000	SURCHARGED
180 minute winter	S03	172	48.542	0.862	4.4	1.3079	0.0000	SURCHARGED
120 minute summer	S04	386	47.652	0.042	2.0	0.0478	0.0000	OK
30 minute summer	S05	220	47.630	0.040	2.0	0.0447	0.0000	OK
15 minute winter	S06	10	47.602	0.082	8.7	0.1059	0.0000	OK
15 minute winter	S07	11	47.481	0.081	8.6	0.0921	0.0000	OK
15 minute winter	S08	12	47.271	0.081	8.6	0.0921	0.0000	OK
15 minute winter	S09	12	47.130	0.080	8.5	0.0900	0.0000	OK
15 minute winter	S10	13	46.933	0.083	8.4	0.0940	0.0000	OK
15 minute winter	EX MH - SW Outfall	13	46.874	0.074	8.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	S01	1.000	S02	7.2	0.498	0.268	0.5747	
180 minute winter	S02	1.001	S03	-2.4	0.138	-0.078	2.1870	
180 minute winter	S03	Hydro-Brake®	S04	2.0				
120 minute summer	S04	1.003	S05	2.0	0.414	0.069	0.0243	
30 minute summer	S05	1.004	S06	2.0	0.435	0.064	0.1234	
15 minute winter	S06	1.005	S07	8.6	0.666	0.267	0.3124	
15 minute winter	S07	1.006	S08	8.6	0.668	0.269	0.5501	
15 minute winter	S08	1.007	S09	8.5	0.664	0.266	0.3652	
15 minute winter	S09	1.008	S10	8.4	0.656	0.262	0.5239	
15 minute winter	S10	1.009	EX MH - SW Outfall	8.2	0.670	0.264	0.1309	24.9

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APPENDIX B

Foul Sewer Network Design

Design Settings

Frequency of use (kDU)	0.50	Minimum Velocity (m/s)	1.00
Flow per dwelling per day (l/day)	2680	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	3.000
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Units	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
F01	18.0	49.600	Foul MH	712965.957	729799.520	1.250
F02	6.0	49.600	Foul MH	712982.428	729796.574	1.460
F03		49.550	Foul MH	713029.316	729783.101	2.020
F04		49.680	Foul MH	713044.548	729784.614	2.340
F05		49.450	Foul MH	713062.078	729810.338	2.500
F06		49.350	Foul MH	713110.439	729821.352	3.020
EX MH - FS Outfall		48.720	Foul MH	713137.917	729833.070	2.770

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	F01	F02	16.732	1.500	48.350	48.140	0.210	79.7	150
1.001	F02	F03	48.785	1.500	48.140	47.530	0.610	80.0	150
1.002	F03	F04	15.307	1.500	47.530	47.340	0.190	80.6	150
1.003	F04	F05	31.129	1.500	47.340	46.950	0.390	79.8	150
1.004	F05	F06	49.599	1.500	46.950	46.330	0.620	80.0	150
1.005	F06	EX MH - FS Outfall	29.872	1.500	46.330	45.950	0.380	78.6	150

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Velocity (m/s)
1.000	F01	F02	0.982	17.3	2.1	1.100	1.310	1.310	0.000	18.0	0.0	0.660
1.001	F02	F03	0.980	17.3	2.4	1.310	1.870	1.870	0.000	24.0	0.0	0.690
1.002	F03	F04	0.976	17.3	2.4	1.870	2.190	2.190	0.000	24.0	0.0	0.688
1.003	F04	F05	0.981	17.3	2.4	2.190	2.350	2.350	0.000	24.0	0.0	0.691
1.004	F05	F06	0.980	17.3	2.4	2.350	2.870	2.870	0.000	24.0	0.0	0.690
1.005	F06	EX MH - FS Outfall	0.988	17.5	2.4	2.870	2.620	2.870	0.000	24.0	0.0	0.697

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APPENDIX B

Foul Sewer Network Design

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 313000, Northing: 229800,

	Interval		Years													
DURATION	6months	1year	2	3	4	5	10	20	30	50	75	100	150	200	250	500
5 mins	2.5	3.7	4.4	5.3	6.0	6.6	8.3	10.4	11.7	13.7	15.5	16.8	19.0	20.7	22.1	N/A
10 mins	3.5	5.2	6.1	7.4	8.4	9.1	11.6	14.4	16.4	19.1	21.5	23.5	26.5	28.8	30.8	N/A
15 mins	4.2	6.1	7.1	8.8	9.9	10.7	13.6	17.0	19.2	22.5	25.3	27.6	31.1	33.9	36.2	N/A
30 mins	5.5	7.9	9.3	11.3	12.7	13.7	17.3	21.4	24.1	28.0	31.4	34.1	38.3	41.6	44.3	N/A
1 hours	7.3	10.4	12.0	14.5	16.2	17.6	21.9	26.9	30.2	34.8	39.0	42.2	47.2	51.1	54.3	N/A
2 hours	9.6	13.5	15.6	18.7	20.8	22.4	27.8	33.8	37.8	43.4	48.3	52.2	58.1	62.7	66.5	N/A
3 hours	11.3	15.8	18.1	21.7	24.1	25.9	31.9	38.7	43.1	49.3	54.8	59.1	65.6	70.7	74.9	N/A
4 hours	12.7	17.6	20.2	24.1	26.7	28.7	35.2	42.5	47.3	54.0	59.9	64.5	71.5	77.0	81.4	N/A
6 hours	15.0	20.6	23.5	27.9	30.9	33.1	40.4	48.6	54.0	61.4	68.0	73.0	80.8	86.7	91.7	N/A
9 hours	17.6	24.0	27.4	32.4	35.7	38.2	46.5	55.6	61.6	69.8	77.1	82.7	91.2	97.8	103.2	N/A
12 hours	19.8	26.8	30.5	35.9	39.6	42.3	51.3	61.2	67.6	76.5	84.3	90.3	99.4	106.5	112.3	N/A
18 hours	23.3	31.3	35.5	41.7	45.7	48.9	58.9	69.9	77.1	87.0	95.6	102.2	112.3	120.0	126.4	N/A
24 hours	26.2	35.0	39.6	46.3	50.7	54.1	65.0	76.9	84.6	95.3	104.5	111.6	122.4	130.7	137.5	160.8
2 days	32.5	42.5	47.7	55.1	60.0	63.8	75.6	88.4	96.6	107.9	117.6	125.0	136.2	144.7	151.7	175.5
3 days	37.6	48.6	54.2	62.3	67.6	71.6	84.2	97.8	106.5	118.3	128.5	136.2	147.8	156.6	163.8	188.3
4 days	42.0	53.9	59.9	68.5	74.1	78.4	91.7	106.0	115.1	127.4	138.0	146.0	158.0	167.1	174.5	199.7
6 days	49.8	63.2	69.8	79.4	85.5	90.2	104.7	120.2	130.0	143.2	154.5	163.0	175.8	185.4	193.2	219.7
8 days	56.7	71.3	78.5	88.8	95.5	100.5	116.1	132.6	142.9	156.9	168.9	177.8	191.2	201.3	209.5	237.1
10 days	63.0	78.7	86.5	97.5	104.5	109.9	126.4	143.8	154.7	169.3	181.8	191.2	205.2	215.7	224.2	252.8
12 days	68.9	85.6	93.8	105.5	112.9	118.5	135.9	154.1	165.5	180.8	193.8	203.5	218.1	229.0	237.8	267.3
16 days	79.8	98.3	107.4	120.1	128.3	134.4	153.3	173.0	185.2	201.6	215.6	226.0	241.4	253.0	262.4	293.6
20 days	89.9	110.0	119.8	133.6	142.4	148.9	169.1	190.1	203.2	220.6	235.3	246.3	262.6	274.8	284.6	317.4
25 days	101.7	123.7	134.3	149.2	158.7	165.7	187.4	209.9	223.8	242.3	258.0	269.6	286.8	299.7	310.1	344.6

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Print | Close Report

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Pablo Martin Bussi
Site name:	Wainsfort Grove
Site location:	Dublin

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.30638° N
Longitude:	6.3051° W
Reference:	2831741434
Date:	Sep 05 2022 12:27

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.133

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics	Default	Edited
SAAR (mm):	883	883
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.13	2.13
Growth curve factor 100 years:	2.61	2.61
Growth curve factor 200 years:	2.86	2.86

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

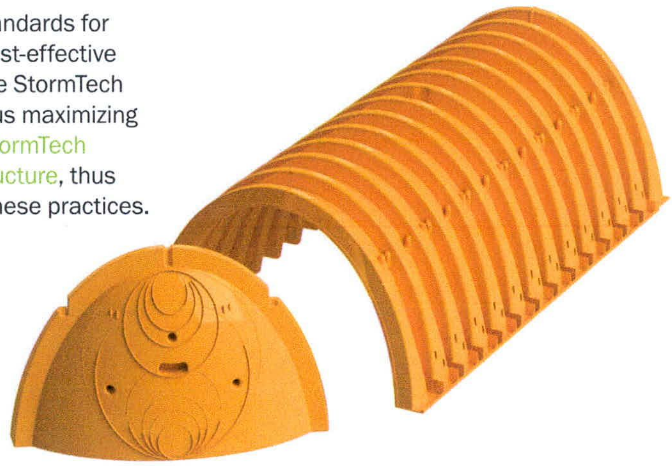
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.32	0.32
1 in 1 year (l/s):	0.27	0.27
1 in 30 years (l/s):	0.68	0.68
1 in 100 year (l/s):	0.83	0.83
1 in 200 years (l/s):	0.91	0.91

StormTech® ADS®

STORMTECH SC-740 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH SC-740 CHAMBER

(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
85.4" x 51" x 30"
2,170 mm x 1,295 mm x 762 mm

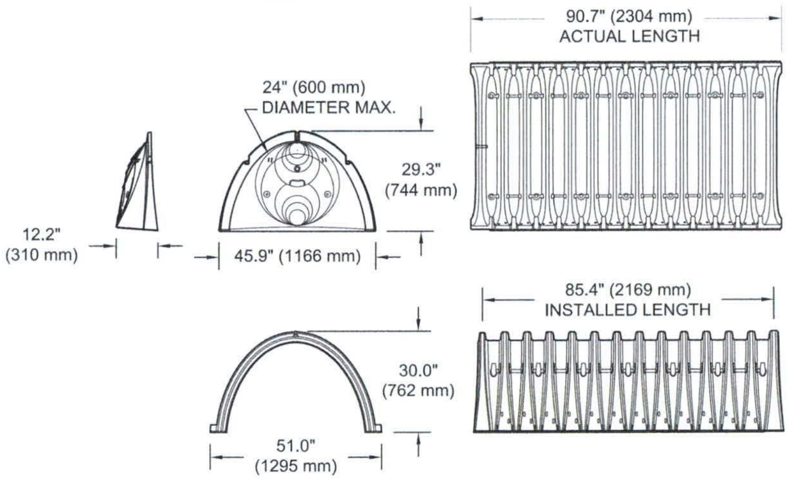
Chamber Storage
45.9 ft^3 (1.30 m^3)

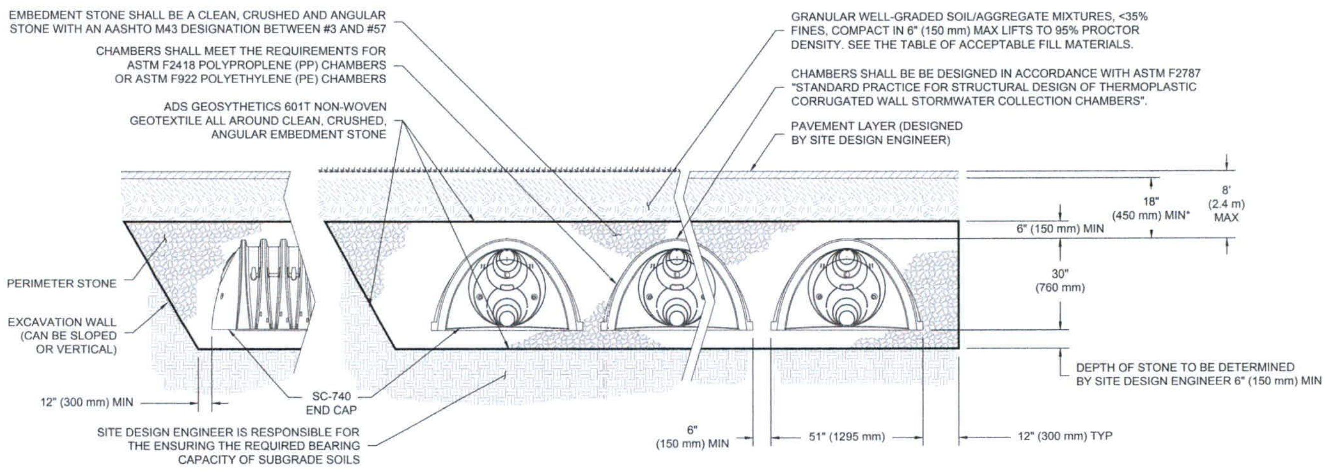
Min. Installed Storage*
74.9 ft^3 (2.12 m^3)

Weight
74.0 lbs (33.6 kg)

Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

StormTech®

ADS®

SC-740 CUMULATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)		Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
42 (1067)	↑	45.90 (1.300)	74.90 (2.121)
41 (1041)		45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone	45.90 (1.300)	72.64 (2.057)
39 (991)	Cover	45.90 (1.300)	71.52 (2.025)
38 (965)		45.90 (1.300)	70.39 (1.993)
37 (940)	↓	45.90 (1.300)	69.26 (1.961)
36 (914)		45.90 (1.300)	68.14 (1.929)
35 (889)		45.85 (1.298)	66.98 (1.897)
34 (864)		45.69 (1.294)	65.75 (1.862)
33 (838)		45.41 (1.286)	64.46 (1.825)
32 (813)		44.81 (1.269)	62.97 (1.783)
31 (787)		44.01 (1.246)	61.36 (1.737)
30 (762)		43.06 (1.219)	59.66 (1.689)
29 (737)		41.98 (1.189)	57.89 (1.639)
28 (711)		40.80 (1.155)	56.05 (1.587)
27 (686)		39.54 (1.120)	54.17 (1.534)
26 (660)		38.18 (1.081)	52.23 (1.479)
25 (635)		36.74 (1.040)	50.23 (1.422)
24 (610)		35.22 (0.977)	48.19 (1.365)
23 (584)		33.64 (0.953)	46.11 (1.306)
22 (559)		31.99 (0.906)	44.00 (1.246)
21 (533)		30.29 (0.858)	1.85 (1.185)
20 (508)		28.54 (0.808)	39.67 (1.123)
19 (483)		26.74 (0.757)	37.47 (1.061)
18 (457)		24.89 (0.705)	35.23 (0.997)
17 (432)		23.00 (0.651)	32.96 (0.939)
16 (406)		21.06 (0.596)	30.68 (0.869)
15 (381)		19.09 (0.541)	28.36 (0.803)
14 (356)		17.08 (0.484)	26.03 (0.737)
13 (330)		15.04 (0.426)	23.68 (0.670)
12 (305)		12.97 (0.367)	21.31 (0.608)
11 (279)		10.87 (0.309)	18.92 (0.535)
10 (254)		8.74 (0.247)	16.51 (0.468)
9 (229)		6.58 (0.186)	14.09 (0.399)
8 (203)		4.41 (0.125)	11.66 (0.330)
7 (178)		2.21 (0.063)	9.21 (0.264)
6 (152)	↑	0 (0)	6.76 (0.191)
5 (127)		0 (0)	5.63 (0.160)
4 (102)	Stone	0 (0)	4.51 (0.128)
3 (76)	Foundation	0 (0)	3.38 (0.096)
2 (51)		0 (0)	2.25 (0.064)
1 (25)	↓	0 (0)	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds³)	Stone Foundation Depth		
	6"	12"	16"
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
METRIC KILOGRAMS (m³)	150 mm	300 mm	450 mm
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.

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Kingspan Klargester

SEPARATORS

A RANGE OF FUEL/OIL SEPARATORS FOR PEACE OF MIND

Kingspan. Environmental

Separators

A RANGE OF FUEL/OIL SEPARATORS FOR PEACE OF MIND

Surface water drains normally discharge to a watercourse or indirectly into underground waters (groundwater) via a soakaway. Contamination of surface water by oil, chemicals or suspended solids can cause these discharges to have a serious impact on the receiving water.

The Environment Regulators, Environment Agency, England and Wales, SEPA, Scottish Environmental Protection Agency in Scotland and Department of Environment & Heritage in Northern Ireland, have published guidance on surface water disposal, which offers a range of means of dealing with pollution both at source and at the point of discharge from site (so called 'end of pipe' treatment). These techniques are known as 'Sustainable Drainage Systems' (SuDS).

Where run-off is draining from relatively low risk areas such as car-parks and non-operational areas, a source control approach, such as permeable surfaces or infiltration trenches, may offer a suitable means of treatment, removing the need for a separator.

Oil separators are installed on surface water drainage systems to protect receiving waters from pollution by oil, which may be present due to minor leaks from vehicles and plant, from accidental spillage.

Effluent from industrial processes and vehicle washing should normally be discharged to the foul sewer (subject to the approval of the sewerage undertaker) for further treatment at a municipal treatment works.

SEPARATOR STANDARDS AND TYPES

A British (and European) standard (EN 858-1 and 858-2) for the design and use of prefabricated oil separators has been adopted. New prefabricated separators should comply with the standard.

SEPARATOR CLASSES

The standard refers to two 'classes' of separator, based on performance under standard test conditions.

CLASS I

Designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets.

CLASS II

Designed to achieve a concentration of less than 100mg/l oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies (for example where the effluent passes to foul sewer).

Both classes can be produced as full retention or bypass separators. The oil concentration limits of 5 mg/l and 100 mg/l are only applicable under standard test conditions. It should not be expected that separators will comply with these limits when operating under field conditions.

FULL RETENTION SEPARATORS

Full retention separators treat the full flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

On large sites, some short term flooding may be an acceptable means of limiting the flow rate and hence the size of full retention systems.

BYPASS SEPARATORS

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

FORECOURT SEPARATORS

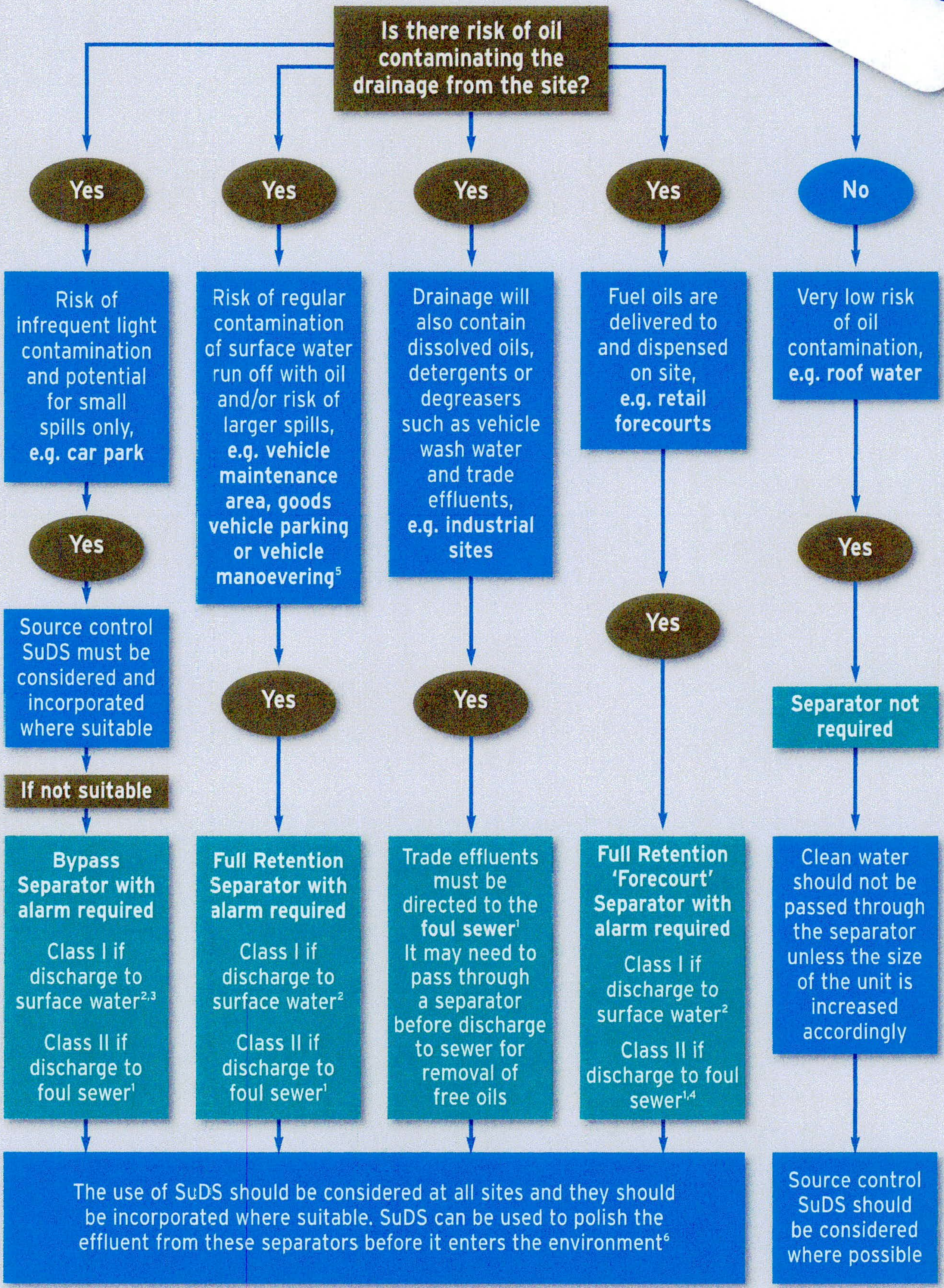
Forecourt separators are full retention separators specified to retain on site the maximum spillage likely to occur on a petrol filling station. They are required for both safety and environmental reasons and will treat spillages occurring during vehicle refuelling and road tanker delivery. The size of the separator is increased in order to retain the possible loss of the contents of one compartment of a road tanker, which may be up to 7,600 litres.

SELECTING THE RIGHT SEPARATOR

The chart on the following page gives guidance to aid selection of the appropriate type of fuel/oil separator for use in surface water drainage systems which discharge into rivers and soakaways.

For further detailed information, please consult the Environment Agency Pollution Prevention Guideline 03 (PPG 3) 'Use and design of oil separators in surface water drainage systems' available from their website.

Klargester has a specialist team who provide technical assistance in selecting the appropriate separator for your application.



1 You must seek prior permission from your local sewer provider before you decide which separator to install and before you make any discharge.
2 You must seek prior permission from the relevant environmental body before you decide which separator to install.
3 In this case, if it is considered that there is a low risk of pollution a source control SuDS scheme may be appropriate.
4 In certain circumstances, the sewer provider may require a Class 1 separator for discharges to sewer to prevent explosive atmospheres from being generated.
5 Drainage from higher risk areas such as vehicle maintenance yards and goods vehicle parking areas should be connected to foul sewer in preference to surface water.
6 In certain circumstances, a separator may be one of the devices used in the SuDS scheme. Ask us for advice.

Bypass NSB RANGE

APPLICATION

Bypass separators are used when it is considered an acceptable risk not to provide full treatment, for very high flows, and are used, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small, e.g.

- Surface car parks.
- Roadways.
- Lightly contaminated commercial areas.

PERFORMANCE

Klargester were one of the first UK manufacturers to have separators tested to EN 858-1. Klargester have now added the NSB bypass range to their portfolio of certified and tested models. The NSB number denotes the maximum flow at which the separator treats liquids. The British Standards Institute (BSI) tested the required range of Klargester full retention separators and certified their performance in relation to their flow and process performance assessing the effluent qualities to the requirements of EN 858-1. Klargester bypass separator designs follow the parameters determined during the testing of the required range of bypass separators.

Each bypass separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer.

The unit is designed to treat 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3 NSB = 0.0018A(m2). Flows generated by higher rainfall rates will pass through part of the separator and bypass the main separation chamber.

Class I separators are designed to achieve a concentration of 5mg/litre of oil under standard test conditions.

Class II separators are designed to achieve a concentration of 100mg/litre of oil under standard test conditions.

FEATURES

- Light and easy to install.
- Class I and Class II designs.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Oil alarm system available (required by EN 858-1 and PPG3).
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size bypass separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the flow is not pumped .
- The required discharge standard. This will decide whether a Class I or Class II unit is required.
- The drain invert inlet depth.
- Pipework type, size and orientation.

SIZES AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	PEAK FLOW RATE (l/s)	DRAINAGE AREA (m²)	STORAGE CAPACITY (litres) SILT	OIL	UNIT LENGTH (mm)	UNIT DIA. (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	STANDARD FALL ACROSS (mm)	MIN. INLET INVERT (mm)	STANDARD PIPEWORK DIA. (mm)
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	160
NSBP004	4.5	45	2500	450	60	1700	1350	600	1420	1320	100	500	160
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	160
NSBE010	10	100	5560	1000	150	2069	1220	750	1450	1350	100	700	315
NSBE015	15	150	8335	1500	225	2947	1220	750	1450	1350	100	700	315
NSBE020	20	200	11111	2000	300	3893	1220	750	1450	1350	100	700	375
NSBE025	25	250	13890	2500	375	3575	1420	750	1680	1580	100	700	375
NSBE030	30	300	16670	3000	450	4265	1420	750	1680	1580	100	700	450
NSBE040	40	400	22222	4000	600	3230	1920	600	2185	2035	150	1000	500
NSBE050	50	500	27778	5000	750	3960	1920	600	2185	2035	150	1000	600
NSBE075	75	750	41667	7500	1125	5841	1920	600	2235	2035	200	950	675
NSBE100	100	1000	55556	10000	1500	7661	1920	600	2235	2035	200	950	750
NSBE125	125	1250	69444	12500	1875	9548	1920	600	2235	2035	200	950	750

Rotomoulded chamber construction *GRP chamber construction* ** Some units have more than one access shaft – diameter of largest shown.*

Full Retention NSF RANGE

APPLICATION

Full retention separators are used in high risk spillage areas such as:

- Fuel distribution depots.
- Vehicle workshops.
- Scrap Yards

PERFORMANCE

Klargester were the first UK manufacturer to have the required range (3-30 l/sec) certified to EN 858-1 in the UK. The NSF number denotes the flow at which the separator operates.

The British Standards Institute (BSI) have witnessed the performance tests of the required range of separators and have certified their performance, in relation to their flow and process performance to ensure that they met the effluent quality requirements of EN 858-1. Larger separator designs have been determined using the formulas extrapolated from the test range.

Each full retention separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer (Class I units only).
- Automatic closure device.

Klargester full retention separators treat the whole of the specified flow.

FEATURES

- Light and easy to install.
- Class I and Class II designs.
- 3-30 l/sec range independently tested and performance sampled, certified by the BSI.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.

- Oil alarm system available.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size full retention separator, the following information is needed:-

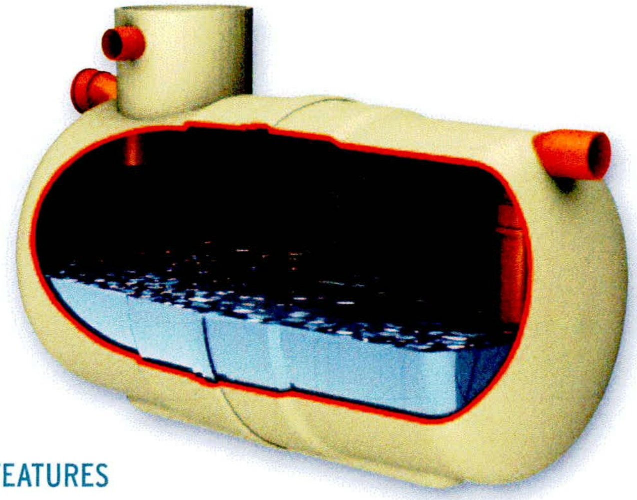
- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the influent is not pumped.
- The required discharge standard. This will decide whether a Class I or Class II unit is required.
- The drain invert inlet depth.
- Pipework type, size and orientation.

SIZES AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	DRAINAGE AREA (m²) PPG-3 (0.018)	STORAGE CAPACITY (litres)		UNIT LENGTH (mm)	UNIT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	MIN. INLET INLET (mm)	STANDARD PIPEWORK DIA. (mm)
			SILT	OIL						
NSFP003	3	170	300	30	1700	1350	1420	1345	500	160
NSFP006	6	335	600	60	1700	1350	1420	1345	500	160
NSFA010	10	555	1000	100	2610	1225	1050	1000	500	200
NSFA015	15	835	1500	150	3910	1225	1050	1000	500	200
NSFA020	20	1115	2000	200	3200	2010	1810	1760	1000	315
NSFA030	30	1670	3000	300	3915	2010	1810	1760	1000	315
NSFA040	40	2225	4000	400	4640	2010	1810	1760	1000	315
NSFA050	50	2780	5000	500	5425	2010	1810	1760	1000	315
NSFA065	65	3610	6500	650	6850	2010	1810	1760	1000	315
NSFA080	80	4445	8000	800	5744	2820	2500	2450	1000	300
NSFA100	100	5560	10000	1000	6200	2820	2500	2450	1000	400
NSFA125	125	6945	12500	1250	7365	2820	2500	2450	1000	450
NSFA150	150	8335	15000	1500	8675	2820	2550	2450	1000	525
NSFA175	175	9725	17500	1750	9975	2820	2550	2450	1000	525
NSFA200	200	11110	20000	2000	11280	2820	2550	2450	1000	600

Rotomoulded chamber construction *GRP chamber construction*

Washdown & Silt



APPLICATION

This unit can be used in areas such as car wash and other cleaning facilities that discharge directly into a foul drain, which feeds to a municipal treatment facility.

If emulsifiers are present the discharge must not be allowed to enter an NS Class I or Class II unit.

- Car wash.
- Tool hire depots.
- Truck cleansing.
- Construction compounds cleansing points.

PERFORMANCE

Such wash down facilities must not be allowed to discharge directly into surface water but must be directed to a foul connection leading to a municipal treatment works as they utilise emulsifiers, soaps and detergents, which can dissolve and disperse the oils.

FEATURES

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.

SIZES AND SPECIFICATIONS

REF.	TOTAL CAPACITY (litres)	MAX. REC. SILT	MAX. FLOW RATE (l/s)	LENGTH (mm)	DIAMETER (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT (mm)	STANDARD FALL ACROSS UNIT (mm)	MIN. INLET INVERT (mm)	STANDARD PIPEWORK DIA. (mm)	APPROX EMPTY (kg)
W1/010	1000	500	3	1123	1225	460	1150	1100	50	500	160	60
W1/020	2000	1000	5	2074	1225	460	1150	1100	50	500	160	120
W1/030	3000	1500	8	2952	1225	460	1150	1100	50	500	160	150
W1/040	4000	2000	11	3898	1225	460	1150	1100	50	500	160	180
W1/060	6000	3000	16	4530	1440	600	1360	1310	50	500	160	320
W1/080	8000	4000	22	3200	2020	600	2005	1955	50	500	160	585
W1/100	10000	5000	27	3915	2020	600	2005	1955	50	500	160	680
W1/120	12000	6000	33	4640	2020	600	2005	1955	50	500	160	770
W1/150	15000	7500	41	5435	2075	600	1940	1890	50	500	160	965
W1/190	19000	9500	52	6865	2075	600	1940	1890	50	500	160	1200

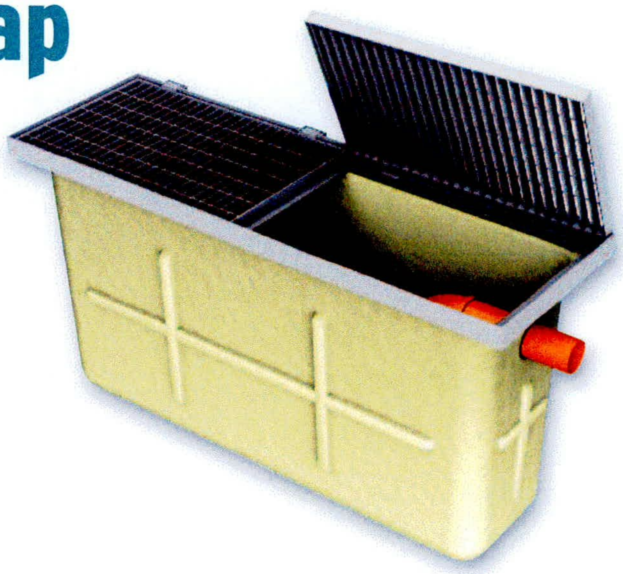
Car Wash Silt Trap

APPLICATION

Car Wash silt trap is designed for use before a separator in car wash applications to ensure effective silt removal.

FEATURES

- FACTA Class B covers.
- Light and easy to install.
- Maintenance from ground level.



Forecourt

APPLICATION

The forecourt separator is designed for installation in petrol filling station forecourts and similar applications. The function of the separator is to intercept hydrocarbon pollutants such as petroleum and oil and prevent their entry to the drainage system, thus protecting the environment against hydrocarbon contaminated surface water run-off and gross spillage.

PERFORMANCE

Operation ensures that the flow cannot exit the unit without first passing through the coalescer assembly.

In normal operation, the forecourt separator has sufficient capacity to provide storage for separated pollutants within the main chamber, but is also able to contain up to 7,600 litres of pollutant arising from the spillage of a fuel delivery tanker compartment on the petrol forecourt. The separator has been designed to ensure that oil cannot exit the separator in the event of a major spillage, subsequently the separator should be emptied immediately.

FEATURES

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- Class I and Class II design.
- Oil storage volume.
- Coalescer (Class I unit only).
- Automatic closure device.
- Oil alarm system available.

INSTALLATION

The unit should be installed on a suitable concrete base slab and surrounded with concrete or pea gravel backfill. See sales drawing for installation.

If the separator is to be installed within a trafficked area, then a suitable cover slab must be designed to ensure that loads are not transmitted to the unit.

The separator should be installed and vented in accordance with Health and Safety Guidance Note HS(G)41 for filling stations, subject to Local Authority requirements.

SIZES AND SPECIFICATIONS

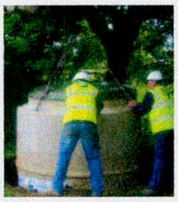
ENVIROCEPTOR CLASS	TOTAL CAP. (litres)	DRAINAGE AREA (m²)	MAX. FLOW RATE (l/s)	LENGTH (mm)	DIAMETER (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT (mm)	STD. FALL ACROSS UNIT (mm)	MIN. INLET INVERT (mm)	STD. PIPEWORK (mm)	EMPTY WEIGHT (kg)
I	10000	555	10	3963	1920	600	2110	2060	50	400	160	500
II	10000	555	10	3963	1920	600	2110	2060	50	400	160	500
I	10000	1110	20	3963	1920	600	2110	2060	50	400	200	500
II	10000	1110	20	3963	1920	600	2110	2060	50	400	200	500

Alarm Systems

British European Standard EN 858-1 and Environment Agency Pollution Prevention Guideline PPG3 requires that all separators are to be fitted with an oil level alarm system and that it should be installed and calibrated by a suitably qualified technician so that it will respond to an alarm condition when the separator requires emptying.

- Easily fitted to existing tanks.
- Excellent operational range.
- Visual and audible alarm.
- Additional telemetry option.

PROFESSIONAL INSTALLERS



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Issue No. 20: August 2014

Hydro-Brake® Flow Control

Modelling Guide

Unit Selection Design Guide

Overview

Hydro-Brake® Flow Controls restrict the flow in surface/storm water or foul/combined sewer systems by inducing a vortex flow pattern in the water passing through the device, having the effect of increasing back-pressure.

Their 'hydrodynamic' rather than 'physical restriction' based operation provides flow regulation whilst maintaining larger clearances than most other types of flow control, making them less susceptible to blockage. Their unique "S"-shaped head-flow characteristic also enables them to pass greater flows at lower heads, which can enable more efficient use of upstream storage facilities.

This document provides guidance relating to the selection and use of Hydro-Brake® Flow Controls for use in surface/storm water and foul/combined sewer systems.

The information provided here is intended for the purposes of general guidance only - individual application requirements may differ. If in doubt, or to enquire about new product additions, please contact HRD Technologies Ltd.

STH Range of Hydro-Brake® Flow Controls

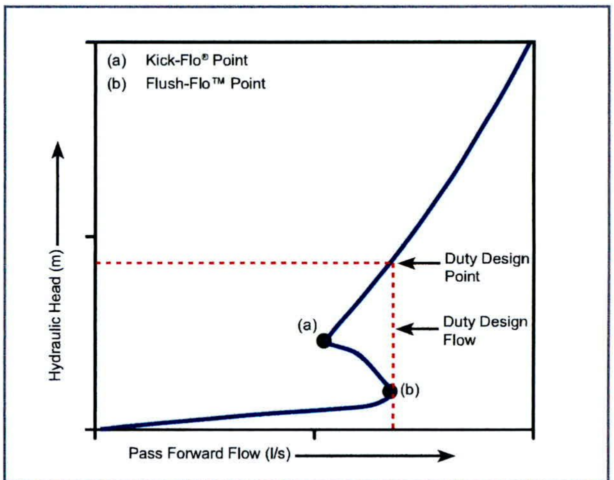
BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4599

See back cover for details.

Hydraulic Characteristics and Specification

Hydro-Brake® Flow Controls should be selected such that the duty/design flow is not exceeded at any point on the head-flow curve, see illustration right. If this is not achievable using the initially selected unit, it may be appropriate to select an alternative option (see selection guidance overleaf).

While the primary aim of a flow control is to provide a particular flow rate at a given upstream head (giving a design/duty point), it is important to note that secondary opportunities, such as potential for optimised storage use, derive from consideration of the full hydraulic characteristic. It is therefore important to ensure that the same flow control, or one confirmed to provide equivalent hydraulic performance, is implemented in any final installation.



Typical Hydro-Brake® Head Versus Flow Characteristics

To ensure correct implementation a multiple design-point specification, defining the main hydraulic features of the selected flow control, can be provided by HRD Technologies Ltd. This should include at least the following information:

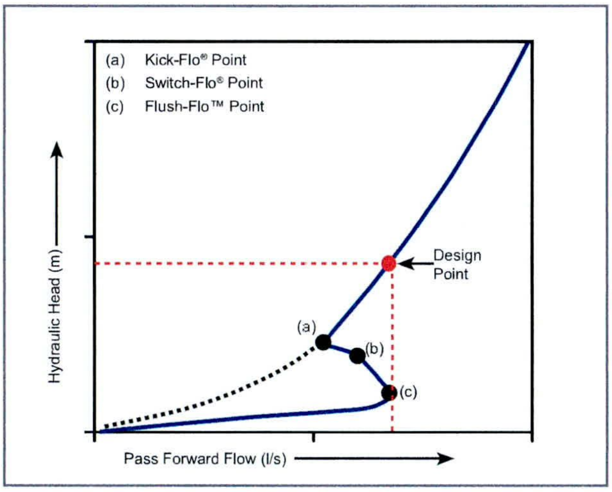
- outlet size and model of Hydro-Brake® Flow Control
- definition of the duty/design point (head and flow)
- definition of the Flush-Flo™ point (head and flow)
- definition of the Kick-Flo® point (head and flow)

To ensure that a drainage system performs as designed, it is strongly recommended that this information is reproduced on any technical specifications.

STH Type Hydro-Brake® Flow Control with BBA Approval

Now included in WinDes® W.12.6!

The new STH type Hydro-Brake® Flow Control range has a unique head / discharge performance curve which introduces a very important feature - the Switch-Flo® Point. This point illustrates the unique performance feature of the STH range which can lead to further savings in upstream storage, whilst also enabling increased inlet / outlet size to further reduce the risk of blockage.



Typical STH Head Versus Flow Characteristics

Kick-Flo® (a) - the point at which the vortex has initiated and at which the curve begins to return back to follow the orifice curve and reach the same design point or desired head / flow condition.

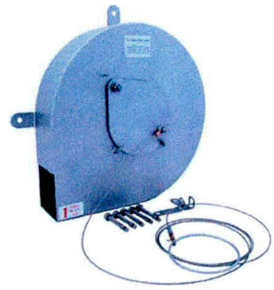
NEW Switch-Flo® (b) - marks the transition between the Kick-Flo® and Flush-Flo™, from vortex initiation to stabilisation. This point adds a new layer of resolution to the Hydro-Brake® curve that has implications to upstream storage savings.

Flush-Flo™ (c) - the point at which the vortex begins to initiate and have a throttling effect. This point on the Hydro-Brake® curve is usually much nearer to the maximum design flow (Design Point), than other vortex flow controls leading to more water passing through the unit during the earlier stages of a storm, thus reducing the amount of water that needs to be stored upstream.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4599

STH Range of Hydro-Brake® Flow Controls

The STH Hydro-Brake® Flow Control is the only vortex flow control available today that has been given the prestigious BBA Approval Certificate. The BBA assessment procedure entails rigorous assessment of production and manufacturing standards, and confirms that the hydraulic performance of the Hydro-Brake® Flow Control matches the data given to designers by HRD Technologies with their head / discharge curves.



A worked example showing the steps to model a Hydro-Brake® Flow Control and associated Stormcell® Storage System within Micro Drainage WinDes® is available on our website:

www.hrdtec.com

Take a Look at Our New Stormwater Web Resource

Engineering Nature's Way™

www.engineeringnaturesway.co.uk

Engineering Nature's Way is a brand new resource for people working with Sustainable Drainage and flood management in the UK.

The site provides an opportunity to share news, opinion, information and best practice for people working in local and central Government; developers, consulting engineers and contractors. Do you have something to share? We would be delighted to receive your contributions.

turning water around ...®

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