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Appendix to Surface Water Design

- Rainfall table for subject's site
- HR Wallingford Greenfield runoff rate estimation report
- Specification/Product Information for:
    - Separators
    - Silt Trap
    - Flow Control Device
- StormTech Chamber Information Sheets: SC-740™

Met Eireann

Return Period Rainfall Depths for sliding Durations

Irish Grid: Easting: 305400, Northing: 228350,

DURATION	Interval 6months,	1year,	Years 2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.6,	4.3,	5.4,	6.1,	6.6,	8.5,	10.8,	12.3,	14.4,	16.4,	17.9,	20.4,	22.3,	23.9,	N/A ,
10 mins	3.4,	5.1,	6.0,	7.5,	8.5,	9.3,	11.9,	15.0,	17.1,	20.1,	22.9,	25.0,	28.4,	31.1,	33.3,	N/A ,
15 mins	4.0,	6.0,	7.1,	8.8,	10.0,	10.9,	14.0,	17.6,	20.1,	23.7,	26.9,	29.4,	33.4,	36.5,	39.2,	N/A ,
30 mins	5.3,	7.8,	9.2,	11.3,	12.8,	14.0,	17.9,	22.4,	25.5,	29.9,	33.8,	37.0,	41.8,	45.7,	48.9,	N/A ,
1 hours	6.9,	10.1,	11.9,	14.6,	16.5,	18.0,	22.8,	28.5,	32.3,	37.7,	42.6,	46.4,	52.4,	57.1,	61.0,	N/A ,
2 hours	9.1,	13.2,	15.4,	18.9,	21.2,	23.1,	29.2,	36.2,	40.9,	47.6,	53.6,	58.3,	65.6,	71.4,	76.2,	N/A ,
3 hours	10.7,	15.4,	18.0,	21.9,	24.6,	26.7,	33.6,	41.6,	47.0,	54.5,	61.3,	66.7,	74.9,	81.3,	86.7,	N/A ,
4 hours	11.9,	17.2,	20.0,	24.4,	27.3,	29.6,	37.2,	46.0,	51.8,	60.1,	67.5,	73.3,	82.2,	89.2,	95.1,	N/A ,
6 hours	14.0,	20.0,	23.3,	28.3,	31.7,	34.3,	43.0,	52.9,	59.5,	68.9,	77.2,	83.7,	93.8,	101.7,	108.2,	N/A ,
9 hours	16.4,	23.4,	27.2,	32.8,	36.7,	39.7,	49.6,	60.9,	68.3,	78.9,	88.3,	95.7,	107.0,	115.9,	123.2,	N/A ,
12 hours	18.4,	26.1,	30.2,	36.5,	40.7,	44.1,	54.9,	67.2,	75.4,	86.9,	97.2,	105.2,	117.5,	127.1,	135.1,	N/A ,
18 hours	21.6,	30.4,	35.2,	42.4,	47.2,	51.0,	63.3,	77.3,	86.6,	99.6,	111.2,	120.2,	134.1,	144.8,	153.8,	N/A ,
24 hours	24.2,	34.0,	39.2,	47.1,	52.4,	56.6,	70.1,	85.4,	95.5,	109.7,	122.3,	132.1,	147.2,	158.9,	168.6,	202.6,
2 days	30.5,	41.7,	47.5,	56.2,	62.0,	66.4,	80.8,	96.8,	107.2,	121.7,	134.4,	144.2,	159.2,	170.7,	180.2,	213.2,
3 days	35.7,	47.9,	54.2,	63.5,	69.6,	74.4,	89.5,	106.2,	116.9,	131.8,	144.8,	154.7,	169.9,	181.5,	191.0,	223.9,
4 days	40.2,	53.3,	60.0,	69.8,	76.3,	81.3,	97.1,	114.3,	125.4,	140.7,	153.9,	164.1,	179.4,	191.2,	200.8,	233.8,
6 days	48.1,	62.7,	70.1,	80.8,	87.9,	93.2,	110.1,	128.4,	140.1,	156.1,	169.9,	180.4,	196.2,	208.2,	218.0,	251.5,
8 days	55.1,	71.0,	79.0,	90.5,	98.0,	103.6,	121.5,	140.7,	152.9,	169.5,	183.8,	194.6,	210.8,	223.1,	233.2,	267.2,
10 days	61.6,	78.5,	87.0,	99.2,	107.1,	113.1,	131.8,	151.8,	164.4,	181.5,	196.2,	207.3,	224.0,	236.6,	246.8,	281.4,
12 days	67.6,	85.5,	94.5,	107.3,	115.6,	121.8,	141.3,	162.0,	175.0,	192.6,	207.7,	219.1,	236.1,	249.0,	259.4,	294.6,
16 days	78.8,	98.5,	108.3,	122.1,	131.1,	137.8,	158.6,	180.5,	194.3,	212.8,	228.6,	240.4,	258.1,	271.4,	282.2,	318.4,
20 days	89.2,	110.5,	121.0,	135.7,	145.2,	152.3,	174.3,	197.3,	211.7,	231.0,	247.4,	259.7,	277.9,	291.6,	302.7,	339.8,
25 days	101.4,	124.4,	135.7,	151.5,	161.6,	169.1,	192.4,	216.7,	231.7,	251.9,	268.9,	281.7,	300.6,	314.7,	326.1,	364.2,

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:	Elena Dragoje
Site name:	Kingswood Ave Development
Site location:	Citywest Business Campus, D24

Site Details

Latitude:	53.29530° N
Longitude:	6.4195° W
Reference:	3717115054
Date:	Oct 10 2022 22:30

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.

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 2.16

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):	865	779.5
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):	5.04	4.46
1 in 1 year (l/s):	4.29	3.79
1 in 30 years (l/s):	10.74	9.51
1 in 100 year (l/s):	13.16	11.65
1 in 200 years (l/s):	14.42	12.77

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SEPARATORS

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Kingspan Environmental

Separators

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helpingyou@klargester.com to make the right decision or call **028 302 66799**

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

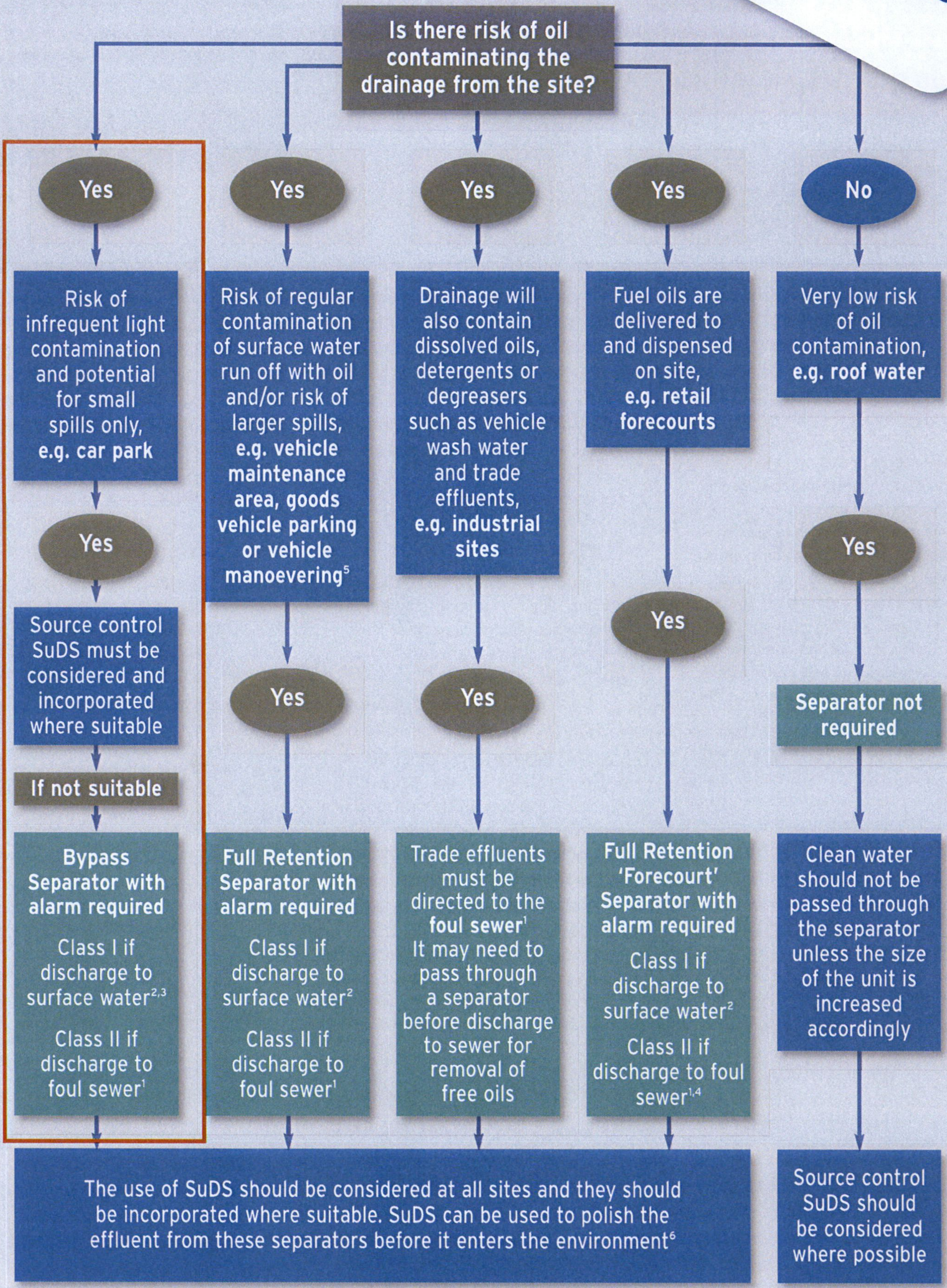
Forecourt separators are full retention separators specified to retain on site the maximum spillage likely to occur on a petrol filling station. They are required for both safety and environmental reasons and will treat spillages occurring during vehicle refuelling and road tanker delivery. The size 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.

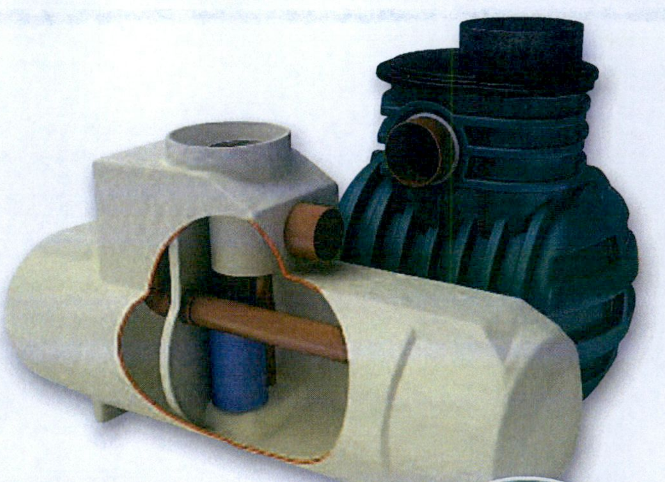
For further detailed information, please consult the Environment Agency Pollution Prevention Guideline 03 (PPG 3) 'Use and design of oil separators in surface water drainage systems' available from their website.

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.
- Silt storage capacity.
- Oil storage volume.
- 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)		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)
				SILT	OIL								
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.*

PROFESSIONAL INSTALLERS

Klargester Accredited Installers

Experience shows that correct installation is a prerequisite for the long-lasting and successful operation of any wastewater treatment product. This is why using an installer with the experience and expertise to install your product is highly recommended.

Services include :

- Site survey to establish ground conditions and soil types
- Advice on system design and product selection
- Assistance on gaining environmental consents and building approvals
- Tank and drainage system installation
- Connection to discharge point and electrical networks
- Waste emptying and disposal

Discover more about the Accredited Installers and locate your local expert online.

www.klargester.com/installers

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Tel: +44 (0) 1296 633000 Fax: +44 (0) 1296 633001 Scottish Office: Tel: +44 (0) 1355 248484
email: info@klargester.com

Ireland: Unit 1a, Derryboy Road, Carnbane Business Park, Newry, Co. Down BT35 6QH

NI Tel : +44 (0) 28 302 66799 Fax: +44 (0) 28 302 60046 ROI Tel: 048 302 66799 Fax: 048 302 60046
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Issue No. 20: August 2014

CDS™ TECHNOLOGIES

Specialists in Wastewater Treatment & Stormwater Management

Surface Water Treatment SUDs Protector

The CDS Non Blocking screening technology is an innovative method of liquid / solid separation for Surface Water, Combined Sewer Overflows (CSO) and Foul Sewage Systems.

- ***SurfSep*** for Surface Water applications
- ***OverSep*** for Combined Sewer Overflow applications.

The technology accomplishes high efficiency separation of settleable particulate matter and capture of floatable material.

A unique feature of the CDS Technology is it's compact design. Both the *SurfSep* and *OverSep* are available as packaged systems, which can either be installed inside pre-cast concrete chamber rings, or complete BBA Approved Polyethylene Chambers unit.

Applications

- Storm-water Treatment
- Combined Sewer Overflow Treatment
- Parking Area Run-Off Treatment
- Vehicle Service Yard Areas
- Pre-treatment for Wetlands, Ponds and Swales
- Rainwater Harvesting
- Pre-treatment for Oil Separators
- Pre-treatment for media and Ground In-filtration Systems

Surface Water System

Hydraulic Analysis

In storm water applications, an analysis of the catchment in terms of its size, topography and land use will provide information for determining flow to be expected for various return periods.

The *SurfSep* is designed for the flow that mobilizes the gross pollutants within the catchment. Since there are variations in catchment response due to region, land use and topography, it is recommended that the selection of flow to be treated will be for return periods of between 3 months and 1 year.

Balancing the cost to the operator against the benefits to the environment

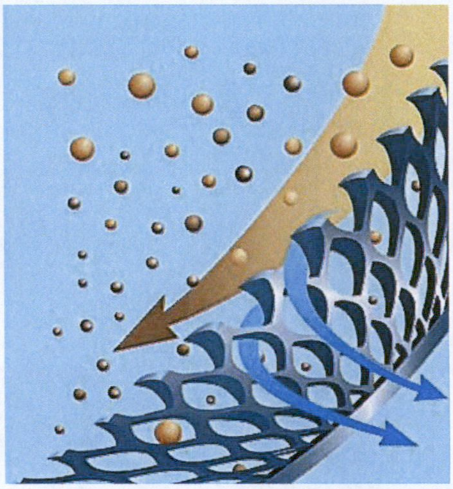
Field evaluations to determine pollutant mobilization have found that the vast majority of pollutants are mobilized in flows that are well below the design capacity' for the conveyance facility - typically known as the 'first flush'.

Therefore it is typical not to design the *SurfSep* models to process the conveyance system's maximum flow in order to achieve a very high level of pollutant removal.

The added value benefit to the operator is reduced civil costs without compromising the benefits to the environment.

How it works

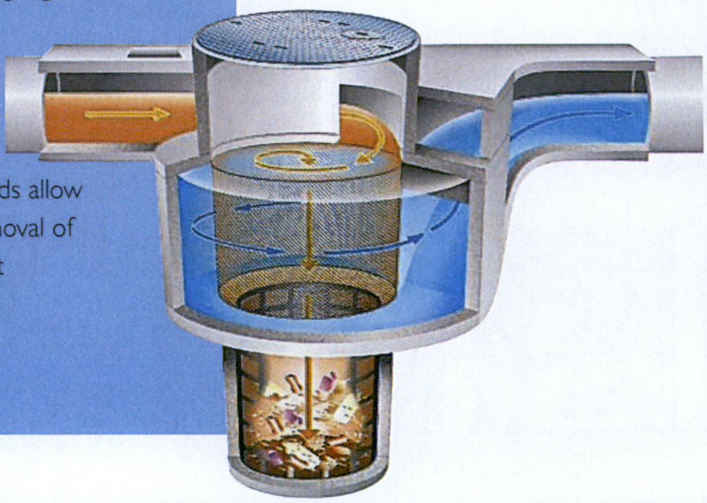
Water and pollutants enter the system and are introduced tangentially inside the separation chamber forming a circular flow motion. Floatables and suspended solids are diverted to the slow moving centre of the flow. Negatively buoyant solids settle out to an undisturbed sump chamber below, while the water passes countercurrently through the separation screen. Floatables remain at the water surface and retained within the screen.



Rapid installation

Primary features

- **Effective**: Capturing more than 95% of solid pollutants.
- **Non-Blocking**: Unique design takes advantage of indirect filtration and properly proportioned hydraulic forces that virtually makes the unit unblockable.
- **Non-Mechanical**: The unit has no moving parts and requires no mechanical devices to support the solid separation function.
- **Low Maintenance Costs**: The system has no moving parts and is fabricated of durable materials.
- **Compact & Flexible**: Design and size flexibility enables the use of various configurations.
- **High Flow Effectiveness**: The technology remains highly effective across a broad spectrum of flow ranges.
- **Assured Pollutant Capture**: All materials captured are retained during high flow conditions.
- **Safe & Easy Pollutant Removal**: Extraction methods allow safe and easy removal of pollutants without manual handling.



Surface Water Treatment Systems

Hydraulic Design

Every application requires a detailed hydraulic analysis to ensure the final installation will perform to effect optimum solids separation without blocking the screen.

After the design flow has been determined, the appropriate standard model can be selected. A selection table is provided on page 7.

The Ultimate SUDs Protector

There a four principal areas of proprietary SUDs technology;

• Infiltration • Flow Control • Storage/attenuation • Treatment

SurfSeps, although a common form of treatment are unique. When installed upstream of any proprietary SUDs technology, the *SurfSep* protects the receiving SUDs from fine solids and debris that would otherwise accumulate over time rendering the SUDs non-operational, as the worst case.

SurfSeps have been successfully installed in front of;

- Soakaways
- Infiltration Trenches
- Filters
- Wetlands
- Ponds and Water Features
- Detention and Retention Systems
- Oil Separators
- Create storage storage systems

to remove fine solids and debris that would otherwise accumulate over time reducing the down stream effectiveness of downstream SUDs assets.

Various independent field trials have shown that the *SurfSep* can remove high levels of Phosphates, Heavy Metals and PolyAramatic Hydrocarbons (PAH's) from the flow.

Infiltration

SurfSeps have been successfully installed in front of ground Infiltration systems to remove grit, fine solids and debris which accumulates in and around the SUDs causing visual degradation in the short term and accumulation of silt and grits leading to reduced volume in the long term.

Studies have also shown that Heavy metals & PAH's accumulate within the SUDs over time before being released back to the environment resulting in elevated concentrations.

Detention & Retention Systems

SurfSeps have been successfully installed in front of collection and attenuation SUDs to remove grit, fine solids and debris which accumulates in the SUDs leading to potential blockage of flow regulators resulting in increased Occupational Health & Safety risk during the treatment of blockages and during the periodic cleaning operations.

Applications

- Rainwater Harvesting
- Road run off
- New Developments
- Motorways
- A / B Roads
- Local Roads
- Residential
- Industrial
- Commercial

Purpose

Removal of plastics, oil, grit, fine solids, organic and inorganic debris, from point source pollution.

Flow Control Systems

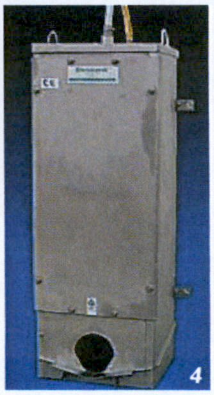
Flow Control

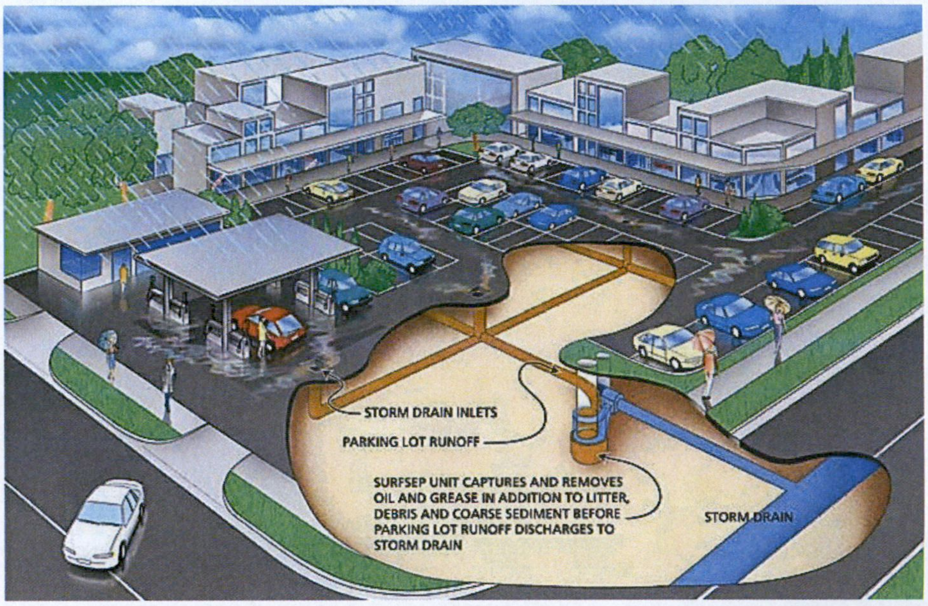
Flow control is often required to reduce flooding of downstream sewer networks or receiving water courses. There are a number of ways to achieve this. The Hydroslide - Float controlled, constant flow regulator, as detailed below is ideally suited to the providing an efficient and reliable means of flow control.

There are four types of standard Hydroslide flow regulators as pictured.

1) Mini
2) HydroLimiter
3) VS - Vertical Standard
4) Combi - self flushing, can be mounted on the dry or wet side of the flow chamber.

Most applications can be dealt with using any of the four models to suit the flow. An accuracy of +/-5% is achievable.





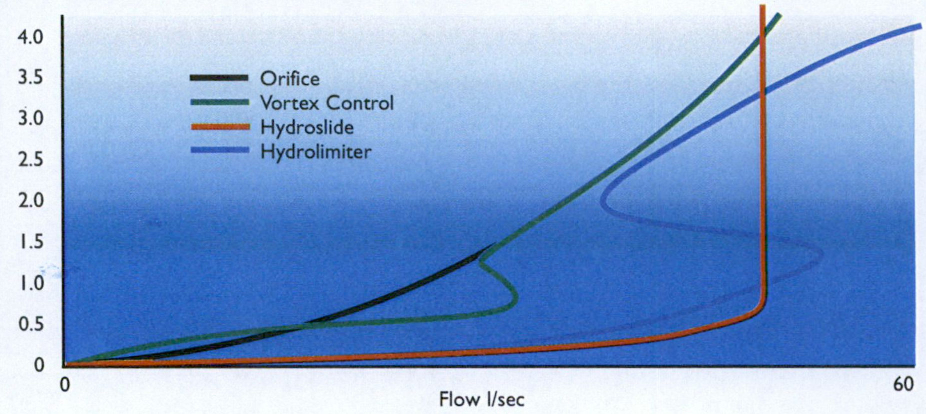
Typical SurfSep installation

Flow Control Technical Design

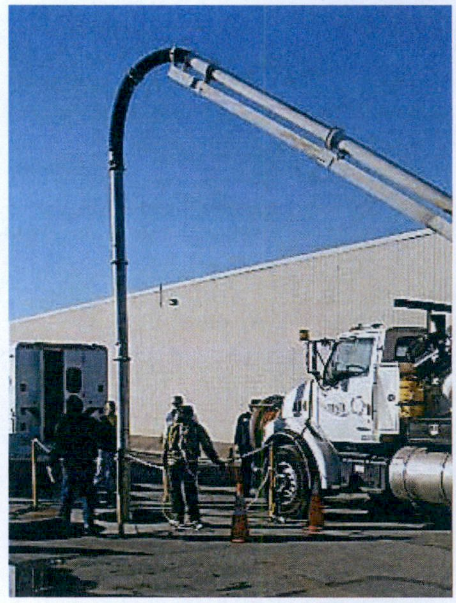
The Hydroslide regulator does not affect the flow until the flow is approaching the set discharge limit, this allows all flow (the first flush) to be discharged to the sewer. Because the flow to the sewer can be optimised at it's maximum permitted capacity the attentuation/storage capacity can be reduced over other methods of flow control, thus giving cost savings in storage provision. This is best explained by looking at a single storm event and comparing the 3 flow regulation processes as was done independantly by WRc in the report titled 'REDUCING THE COST OF STORMWATER STORAGE', Report No. PT1052, March 1995. The chart below represents 50 l/s control and up to 4m of head. The area difference between the curves being the detention volume saving.

Typically the volume saving when using a Hydroslide regulator is between 7% to 40%

Representation of flow through an orifice



Operation & Performance



Performance Criteria

Note: Screen apertures of 4.8 mm , 2.4 mm and 1.2 mm are available.

The 4.8 and 2.4 mm screens are generally used for Surface Water applications, with foul applications using either 2.4 or 1.2 mm aperture units.

Typical 1.2 mm aperture Performance

- shall remove all solids with a single dimension greater than 1.2 mm and positively contain those solids until the unit is cleaned.
- shall remove and positively contain 100 percent of all neutrally buoyant particles with a single dimension greater than 1.2 mm for all flow conditions to design capacity.
- shall remove and positively contain 100 percent of all floating trash and debris with a single dimension greater than 1.2 mm for all flow conditions to the design capacity.
- shall remove a minimum of 50 percent of oil and grease (as defined as the floating portion of total hexane extractable materials) for all flow conditions to the design capacity, without the addition of absorbents.
- shall provide the following minimum particle removal efficiencies (based on a specific gravity of 2.65):

a) 100 percent of all particles greater than 1100 microns.

b) 95 percent of all particles greater than 550 microns.

c) 90 percent of all particles greater than 367 microns.

d) 20 percent of all particles greater than 200 microns.

Maintenance

SurfSep maintenance can be site and drainage area specific. The installation should be inspected periodically to assure its condition to handle anticipated runoff. If pollutant loadings are known, then a preventive maintenance schedule can be developed based on runoff volumes processed.

Since this is seldom the case we recommend;

New Installations

Check the condition of the installation after the first few events. This includes a visual inspection to ascertain that the unit is operating correctly and measuring the amount of deposition that has occurred in the unit. This may be achieved using a 'Dip Stick'.

Ongoing Operation

For the first 12 months the installations sump full volume should be inspected monthly and recorded. When the inspection indicates that the sump full volume is approaching the top of the sump (base of screen) a cleanout should be undertaken.

Cleaning Methods

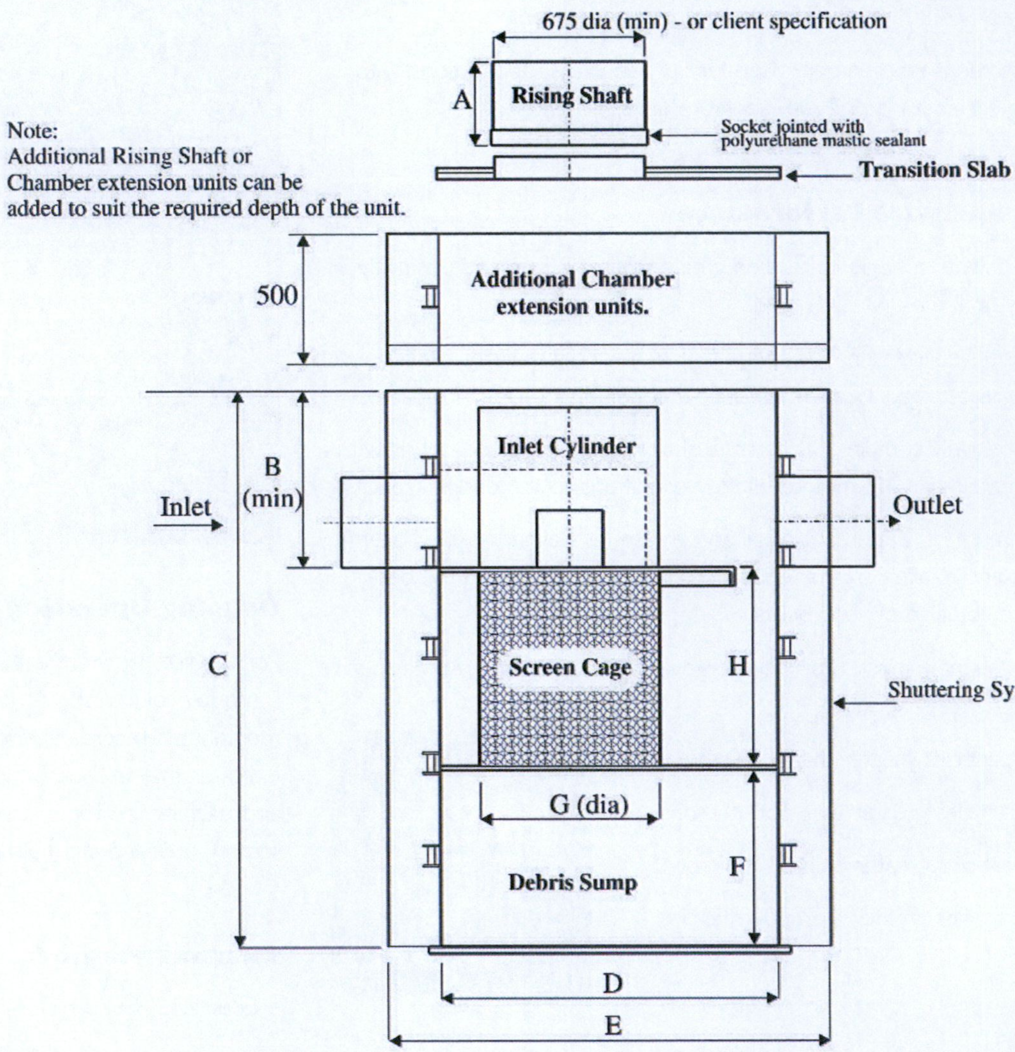
- Eduction (Suction)
- Basket Removal
- Mechanical Grab

Maintenance Cycle

Minimum once per year. Depending on the pollutant load it may be necessary to maintain the installation more frequently.

The operator shall be able to devise the most efficient maintenance schedule for any particular installation over a 12 month operating cycle.

SurfSep Dimensions



***SurfSep* Dimensions (mm)**

	SW0404	SW0604	SW0606	SW0804	SW0806	SW0808	SW1010	SW1012	SW1015
A	370	370	370	370	370	370	500	500	500
B	444	815	615	810	830	810	800	800	830
C	1250	1985	1985	2080	2300	2480	2800	3000	3330
D	800	1200	1200	1500	1500	1500	2000	2000	2000
E	1112	1665	1665	1966	1966	1966	2475	2475	2475
F	400	700	700	700	700	800	1000	1000	1000
G (dia)	400	600	600	800	800	800	1000	1000	1000
H	400	400	600	400	600	800	1000	1200	1500

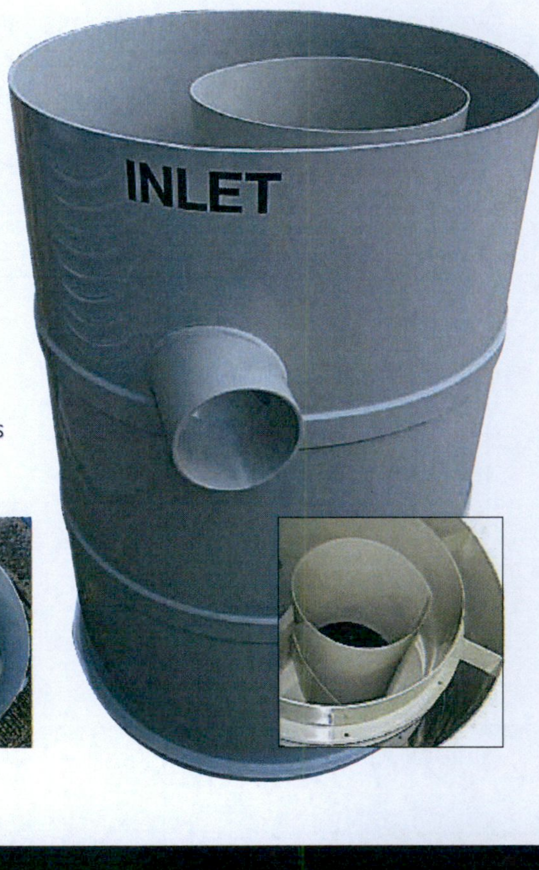
Selection Table - *SurfSep*

Model Reference	Hydraulic Peak Flow Rate l/s	Drainage Area - Impermeable m^2	Chamber Diameter (mm)	Internal Pipe Diameter (mm)
SWI 0404	30	2,000	900	150 / 225
SWI 0604	70	5,000	1200	225
SWI 0606 / 01	140	10,000	1200	225 - 375
SWI 0606 / 02	200	15,000	1200	225 - 375
SWI 0804	275	20,000	1500	300
SWI 0806	350	25,000	1500	450
SWI 0808	400	30,000	1500	450
SWI 1010	480	35,000	2000	450
SWI 1012	550	40,000	2000	450 / 750
SWI 1015	700	50,000	2000	450 / 750

* Proposed Peak Flow Rate for each model calculated using Rational Lloyd Davies with a rainfall intensity of 50mm/hr. For greater flows - special design / construction required.

In-Line *SurfSep* Units (SWI)

These units are used with in the drainage system in-line and are supplied as BBA Approved complete Polyethylene Chamber units from the selection table above.



Off-Line *SurfSep* Units (SWO)

These can be designed either using pre-cast concrete or specially designed Polyethylene chambers.

Model Designation

SurfSep models are firstly identified by the letters SW for Surface Water followed by a letter (**I** or **O**) representing the configuration (**I**nline or **O**ffline).

A four digit number representing the screen diameter and screen height then follows to give the standard model designation for a *SurfSep* screen for installation into standard commercially available pre-fabricated manhole chambers i.e SWI 0806. Example: SWI 0806 designates Surface Water Inline with a separation screen dia 0.8 m and screen height of 0.6m.

Surface Water Treatment

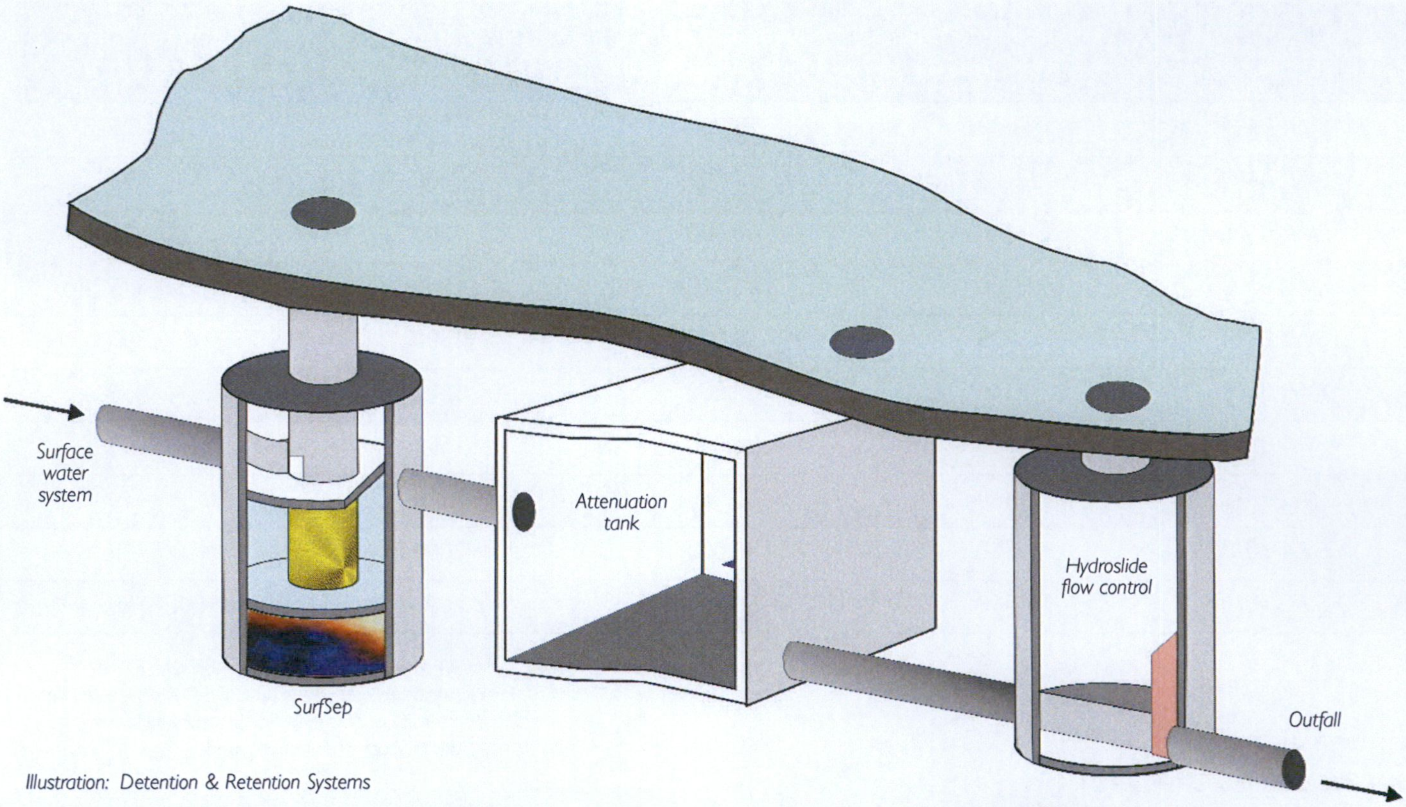


Illustration: Detention & Retention Systems

SurfSeps unit installed in front of attenuation tank / cellular storage system, to remove grit, fine sediments and floating debris which can accumulate within surface water systems. Hydroslide flow control regulating the discharge to the outfall. The Hydroslide can be supplied for installation in an insitu constructed chamber, or as a complete unit housed within a pre-fabricated polyethylene manhole chamber.

BBA BRITISH BOARD OF AGRÉMENT TECHNICAL APPROVALS FOR CONSTRUCTION

* BBA - THIS CERTIFICATE RELATES TO PIPEX UNIVERSAL MANHOLES AND ACCESS CHAMBERS, WHICH ARE MANUFACTURED FROM WELDED POLYPROPYLENE. This Certificate covers the use of the manholes and chambers for drain and sewer applications where they are used for maintenance to depths of 6 mtrs.

Approved Suppliers

If you would like more information please contact:

CDS Technologies is a multi disciplined, international, company offering a comprehensive product range of; wastewater treatment technologies and processes, and stormwater management solutions for attenuation, infiltration, flow control and overflow treatment. CDS have an established network of Distributors and Representatives. Further information can be found on our website www.cdstech.com.au

Alternatively please contact our approved supplier detailed left.

Hydro-Brake® Flow Control

Modelling Guide

Unit Selection Design Guide

Overview

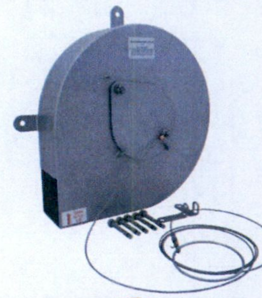
Hydro-Brake® Flow Controls restrict the flow in surface/storm water or foul/combined sewer systems by inducing a vortex flow pattern in the water passing through the device, having the effect of increasing back-pressure.

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

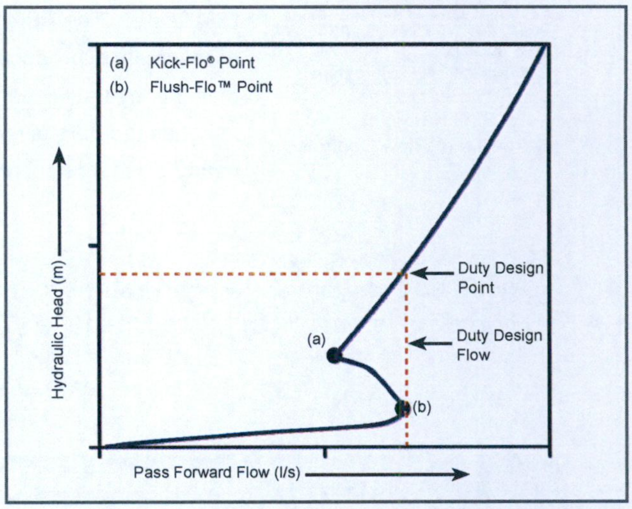
CERTIFICATE No 08/4599

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:

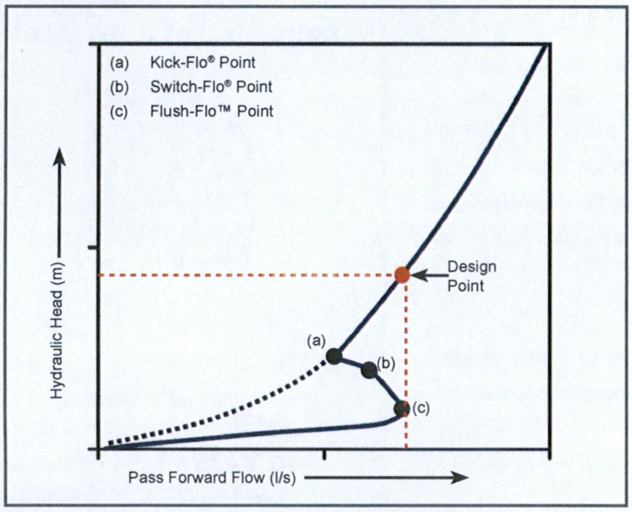
- outlet size and model of Hydro-Brake® Flow Control
- definition of the duty/design point (head and flow)
- definition of the Flush-Flo™ point (head and flow)
- definition of the Kick-Flo® point (head and flow)

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 Win*Des*® 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.

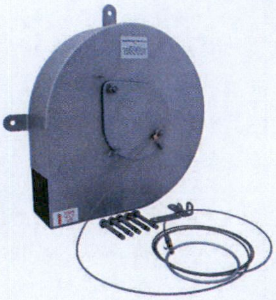
NEW Switch-Flo® (b) - marks the transition between the Kick-Flo® and Flush-Flo™, from vortex initiation to stabilisation. This point adds a new layer of resolution to the Hydro-Brake® curve that has implications to upstream storage savings.

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 Win*Des*® 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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HRD Technologies Ltd

HRD Technologies Ltd • Tootenhill House • Rathcoole • Co. Dublin • Ireland
Tel: +353 (0) 1 4013964 • Fax: +353 (0) 1 4013978 • www.hrdtec.com
HRD Technologies Ltd is a subsidiary of Hydro International plc

Project: D1736 - Subcatchment C#2 & C#3 Attenuation Tank

StormTech
Detention • Retention • Water Quality
A division of ADS

Chamber Model -	SC-740	
Units -	**Metric**	Click Here for Imperial
Number of chambers -	260	
Voids in the stone (porosity) -	43	%
Base of Stone Elevation -	95.80	m
Amount of Stone Above Chambers -	360	mm
Amount of Stone Below Chambers -	280	mm
Area of system -	830	sq.meters

Min. Area - 816.533 sq.meters

☑ Include Perimeter Stone in Calculations

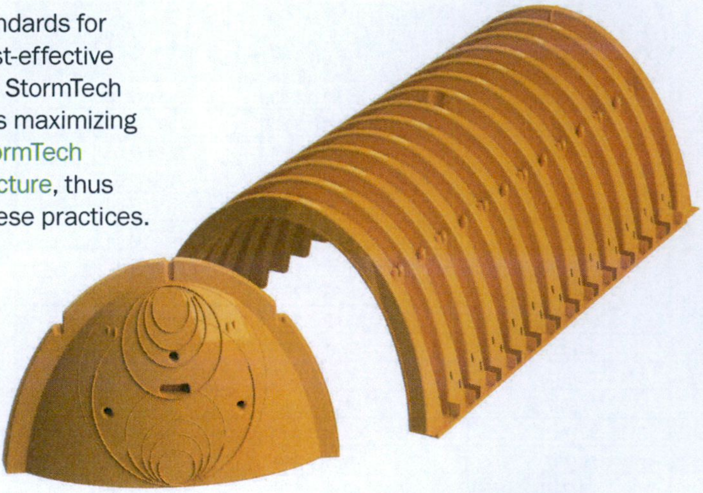
StormTech SC-740 Cumulative Storage Volumes

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)*
1397	0.00	0.00	9.07	9.07	691.422	97.20
1372	0.00	0.00	9.07	9.07	682.357	97.17
1346	0.00	0.00	9.07	9.07	673.292	97.15
1321	0.00	0.00	9.07	9.07	664.227	97.12
1295	0.00	0.00	9.07	9.07	655.161	97.10
1270	0.00	0.00	9.07	9.07	646.096	97.07
1245	0.00	0.00	9.07	9.07	637.031	97.04
1219	0.00	0.00	9.07	9.07	627.966	97.02
1194	0.00	0.00	9.07	9.07	618.900	96.99
1168	0.00	0.00	9.07	9.07	609.835	96.97
1143	0.00	0.00	9.07	9.07	600.770	96.94
1118	0.00	0.00	9.07	9.07	591.705	96.92
1092	0.00	0.00	9.07	9.07	582.640	96.89
1067	0.00	0.00	9.07	9.07	573.574	96.87
1041	0.00	0.40	8.89	9.30	564.509	96.84
1016	0.00	1.20	8.55	9.75	555.213	96.82
991	0.01	2.08	8.17	10.25	545.464	96.79
965	0.02	4.45	7.15	11.60	535.216	96.77
940	0.02	5.90	6.53	12.43	523.616	96.74
914	0.03	7.00	6.06	13.05	511.186	96.71
889	0.03	7.91	5.66	13.57	498.132	96.69
864	0.03	8.69	5.33	14.02	484.557	96.66
838	0.04	9.32	5.06	14.38	470.538	96.64
813	0.04	9.98	4.78	14.75	456.161	96.61
787	0.04	10.71	4.46	15.17	441.410	96.59
762	0.04	11.23	4.24	15.46	426.242	96.56
737	0.04	11.65	4.06	15.71	410.778	96.54
711	0.05	12.09	3.87	15.96	395.073	96.51
686	0.05	12.51	3.68	16.20	379.116	96.49
660	0.05	12.91	3.52	16.42	362.918	96.46
635	0.05	13.27	3.36	16.63	346.497	96.44
610	0.05	13.66	3.19	16.85	329.866	96.41
584	0.05	13.94	3.07	17.01	313.016	96.38
559	0.05	14.24	2.94	17.18	296.007	96.36
533	0.06	14.54	2.81	17.35	278.825	96.33
508	0.06	14.80	2.70	17.50	261.472	96.31
483	0.06	15.06	2.59	17.65	243.972	96.28
457	0.06	15.28	2.50	17.77	226.325	96.26
432	0.06	15.50	2.40	17.90	208.552	96.23
406	0.06	15.70	2.32	18.01	190.653	96.21
381	0.06	15.86	2.25	18.10	172.642	96.18
356	0.06	16.03	2.17	18.20	154.538	96.16
330	0.06	16.19	2.11	18.29	136.336	96.13
305	0.06	16.25	2.08	18.33	118.046	96.10
279	0.00	0.00	9.07	9.07	99.717	96.08
254	0.00	0.00	9.07	9.07	90.652	96.05

229	0.00	0.00	9.07	9.07	81.587	96.03
203	0.00	0.00	9.07	9.07	72.522	96.00
178	0.00	0.00	9.07	9.07	63.457	95.98
152	0.00	0.00	9.07	9.07	54.391	95.95
127	0.00	0.00	9.07	9.07	45.326	95.93
102	0.00	0.00	9.07	9.07	36.261	95.90
76	0.00	0.00	9.07	9.07	27.196	95.88
51	0.00	0.00	9.07	9.07	18.130	95.85
25	0.00	0.00	9.07	9.07	9.065	95.83

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

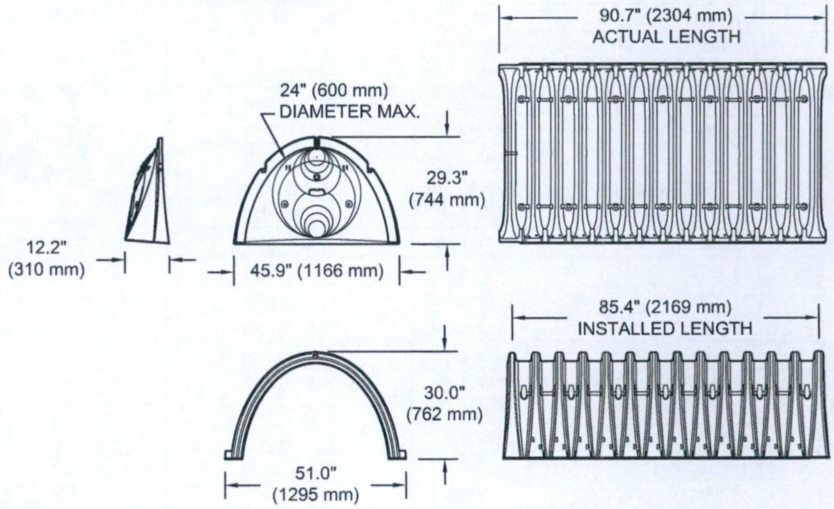
Chamber Storage
45.9 ft³ (1.30 m³)

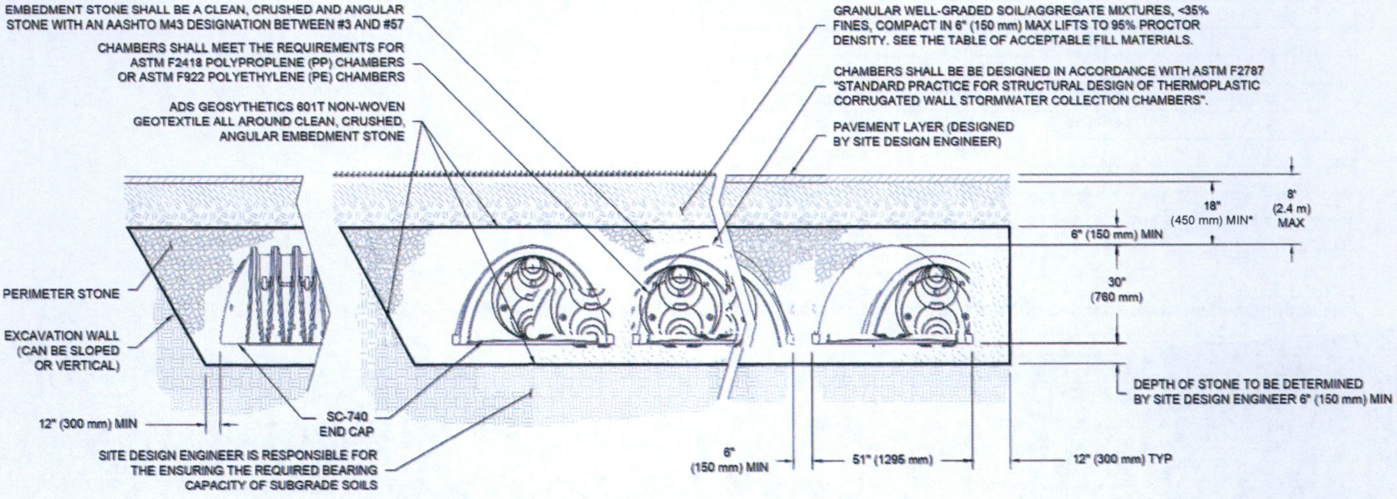
Min. Installed Storage*
74.9 ft³ (2.12 m³)

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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KAVANAGH BURKE
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Discharge Units Calculation

KAVANAGH BURKE
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INPUT FOR FOUL SEWER NETWORK DESIGN

Client: ROCKFACE DEVELOPMENTS LTD
Project: WAREHOUSE DEVELOPMENT AT KINGSWOOD ROAD,
CITYWEST BUSINESS CAMPUS,
DUBLIN 24

Project Ref: **D1736 PL2 (A.I.)**

Floors	Type of Applience	Discharge Unit per Applience	No of Applie.	Discharge Units
OFFICE/STAFF FACILITIES				
GROUND FLOOR PLAN:	WB	0.6	10	6.0
	WC	2.5	10	25.0
	URINAL	0.8	3	2.4
	SINK	1.3	2	2.6
	DISHWASHER	0.8	2	1.6
	SHOWER	0.6	2	1.2
		TOTAL:		***38.8***
FIRST FLOOR PLAN:	WB	0.6	7	4.2
	WC	2.5	7	17.5
	URINAL	0.8	3	2.4
	SINK	1.3	1	1.3
	DISHWASHER	0.8	1	0.8
		TOTAL:		***26.2***
SECOND FLOOR PLAN:	WB	0.6	7	4.2
	WC	2.5	7	17.5
	URINAL	0.8	3	2.4
	SINK	1.3	1	1.3
	DISHWASHER	0.8	1	0.8
		TOTAL:		***26.2***
TOTAL NO OF DICHARGE UNITS FOR OFFICE BLOCK 2:				***91***
			Q (l/sec) =	*6.68*
WAREHOUSE TOILET BLOCK				
GROUND FLOOR PLAN:	WB	0.6	10	6.0
	WC	2.5	6	15.0
	URINAL	0.8	5	4.0
TOTAL NO OF DICHARGE UNITS FOR 1 NO WAREHOUSE TOILET BLOCK:				***25***
			Q (l/sec) =	*3.50*

NOTE:
Discharge units calculated as per Table C.2. Typical values of discharge units of BS EN 752-4.
Typical frequency factors are taken from Table C.1. (k_{DU}=0.7)
Design flow rate is given by the equation: $Q = kDU \sqrt{\Sigma DU}$

KAVANAGH BURKE
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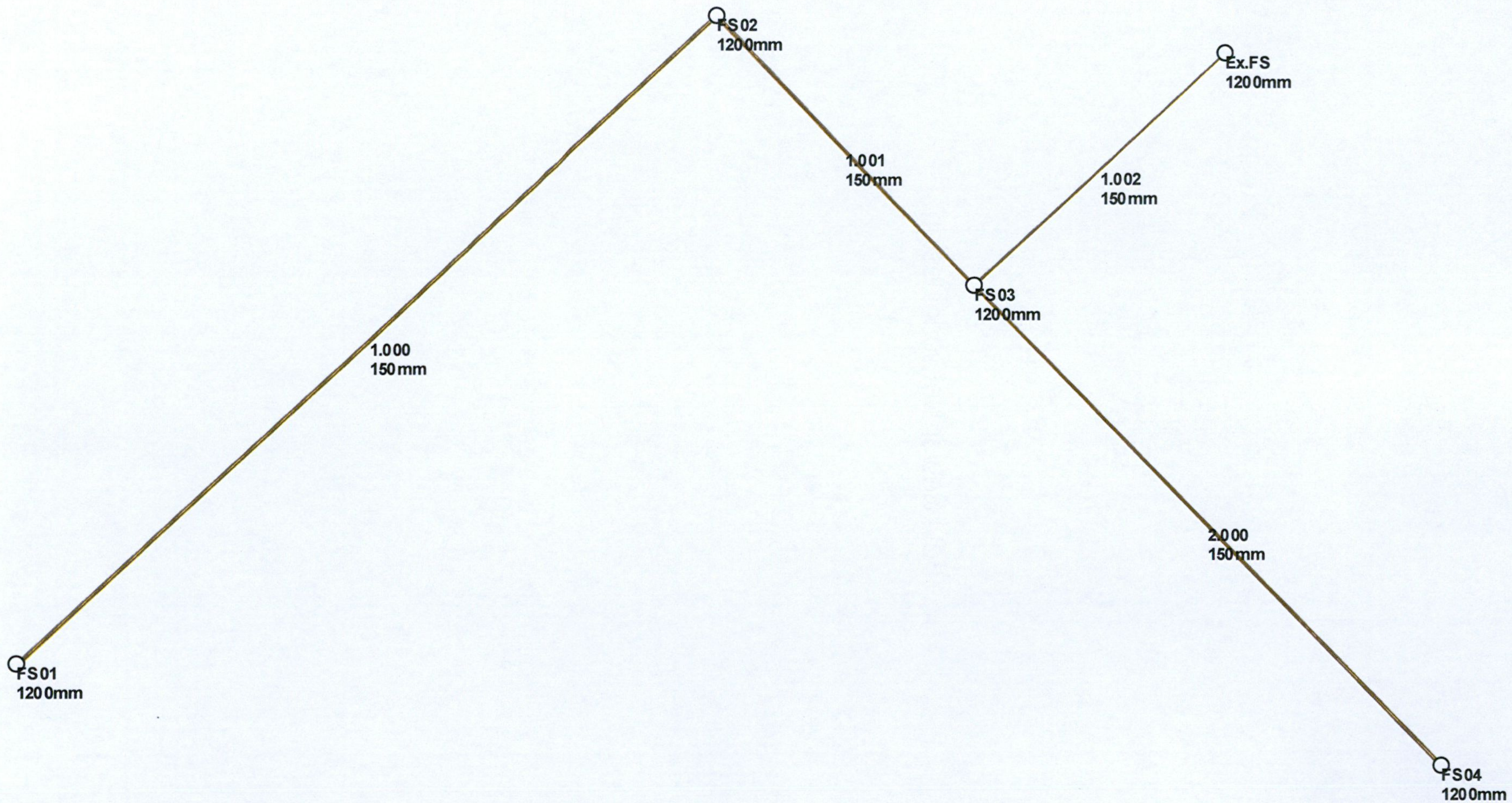
Foul Sewer Network Design

KAVANAGH BURKE CONSULTING ENGINEERS	Kavanagh Burke Ltd Unit F3 Calmount Park, Ballymount, Dublin 12	File: D1736 - FS Network PL2.pfd Network: Foul Network Elena Dragoje 14/10/2022	Page 1 Foul Sewer Network Design: PL 2 (A.I.)



Design Settings

Frequency of use (kDU)	0.70	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	2700	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

FS MH Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	499	1350

>499 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Nodes

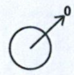
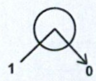
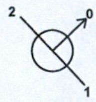
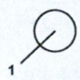
Name	Units	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)
FS01	25.0	98.200	Manhole	FS MH	1200	705324.504	728417.717
FS02		97.900	Manhole	FS MH	1200	705378.450	728468.371
FS03		98.000	Manhole	FS MH	1200	705398.332	728447.259
FS04	91.0	98.350	Manhole	FS MH	1200	705434.206	728409.615
Ex.FS		97.700	Manhole	FS MH	1200	705417.628	728465.423

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	FS01	FS02	74.000	1.500	97.200	96.300	0.900	82.2	150
1.001	FS02	FS03	29.000	1.500	96.300	95.950	0.350	82.9	150
2.000	FS04	FS03	52.000	1.500	97.000	96.400	0.600	86.7	150
1.002	FS03	Ex.FS	26.500	1.500	95.950	95.700	0.250	106.0	150

Name	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Velocity (m/s)
1.000	17.1	3.5	0.850	1.450	0.850	1.450	0	25.0	0.0	0.756
1.001	17.0	3.5	1.450	1.900	1.450	1.900	0	25.0	0.0	0.753
2.000	16.6	6.7	1.200	1.450	1.200	1.450	0	91.0	0.0	0.888
1.002	15.0	7.5	1.900	1.850	1.850	1.900	0	116.0	0.0	0.852

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
FS01	98.200	1.000	1200		0	1.000	97.200	150
FS02	97.900	1.600	1200		1	1.000	96.300	150
					0	1.001	96.300	150
FS03	98.000	2.050	1200		1	2.000	96.400	150
					2	1.001	95.950	150
					0	1.002	95.950	150
FS04	98.350	1.350	1200		0	2.000	97.000	150
Ex.FS	97.700	2.000	1200		1	1.002	95.700	150