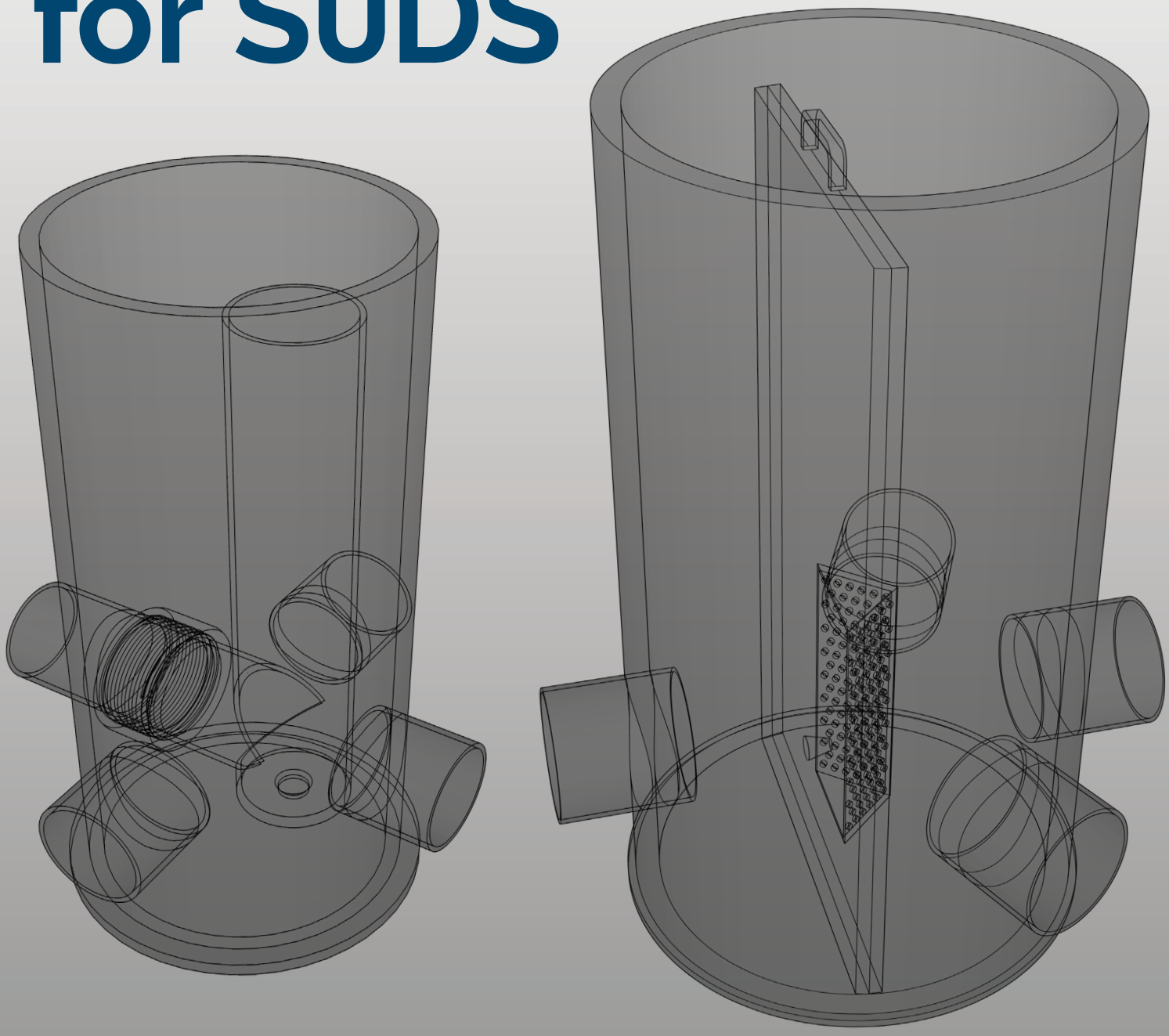
Controflow

Flow Controls for SuDS



Controflow

exclusively from

SuDS store

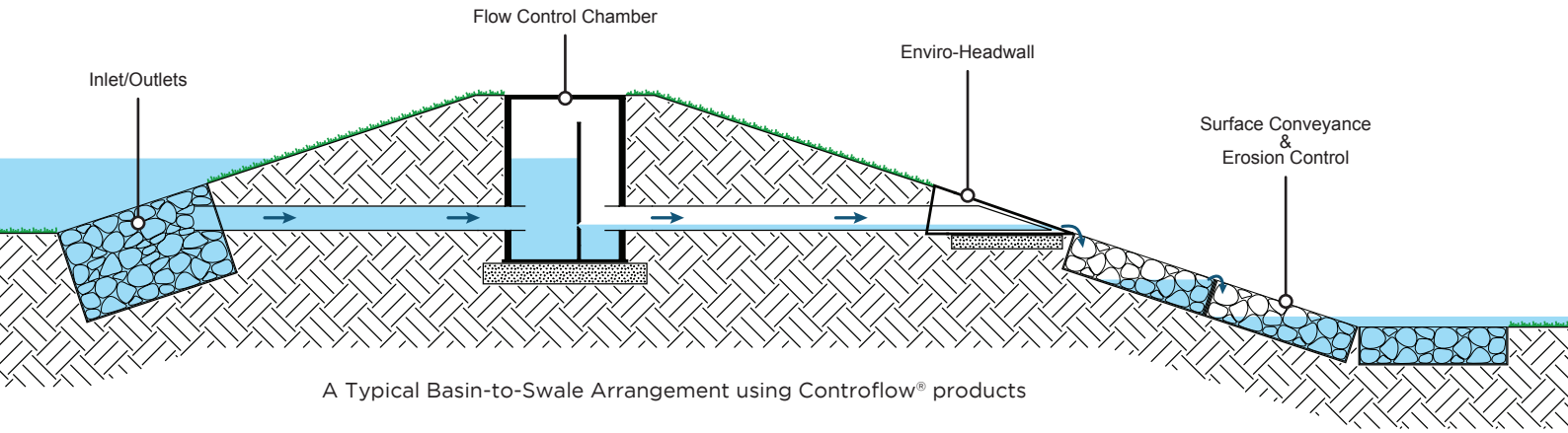
www.sudsstore.com

Controflow

The Controflow® range from SuDSstore has been developed specifically for sustainable drainage systems (SuDS) by professional SuDS designers with over 25 years of experience. With expert support, our products include straightforward, low-cost orifice flow control chambers plus inlet/outlet and conveyance systems in place of unsightly headwalls and pipes - all replicating natural processes.

Controflow® Flow Control Chambers are specifically designed to manage surface water discharge from shallow SuDS elements including permeable pavements, swales and basins. They meet the latest requirements for accessible, small orifice flow controls to manage greenfield runoff rates at modest cost. Based on established engineering principles, they demonstrate straightforward compliance to local authorities as part of the SuDS design approval process. Standard and flexible products are available, and bespoke flow control chambers can also be manufactured to suit site-specific requirements.

Controflow® SuDS Baskets are manufactured in stainless steel mesh for filling with stone and act as attractive, nature-based inlet/outlet and surface conveyance systems, that prevent erosion.



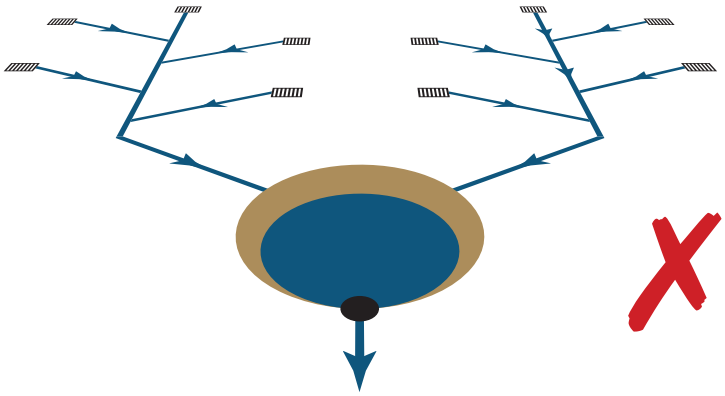
A Typical Basin-to-Swale Arrangement using Controflow® products

The Controflow® range

- Developed by experienced SuDS designers with practicality in mind
- Low-cost flow control devices for use throughout management trains
- Tested in situ for over two decades
- Performance easily verified by local authorities
- Satisfies National Standards as well as the SuDS Manual 2015
- Straightforward specification using established criteria
- Simple installation
- Passive operation with consistent performance
- Minimal maintenance over the long term
- Made to order using recyclable materials
- Standard stock universal formats for flexible specification or bespoke designs available
- Easy access for inspection, measurement or sampling
- Dramatically reduces risk of wildlife mortality
- Well-suited to nature-based SuDS

Efficient & Compliant SuDS

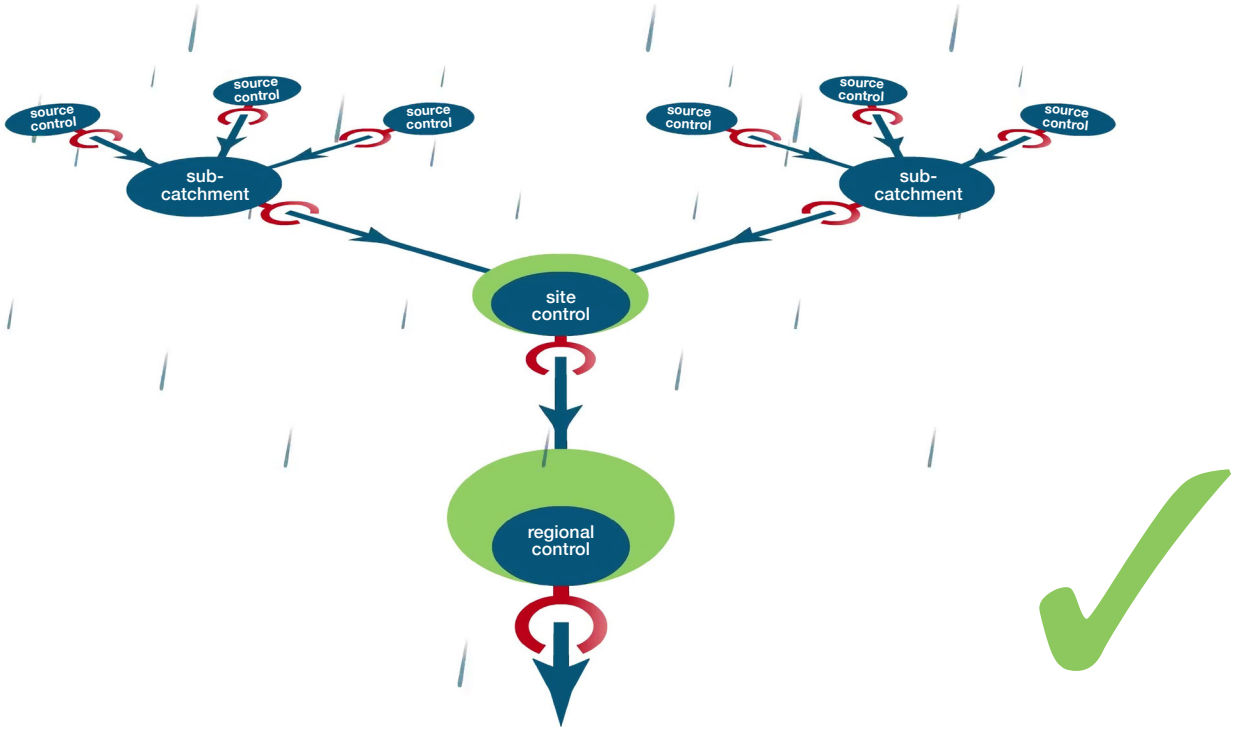
SuDS are set to become mandatory for developments throughout England during 2024, requiring nature-based solutions using components at or near the surface to provide multiple benefits. The key to successful SuDS is water storage and treatment strategically deployed around a site within SuDS elements – such as swales, basins, ponds and, particularly, permeable paving – forming discrete sub-catchments defined by flow controls.



This approach is unlike conventional drainage designs supposedly adapted for SuDS that cannot meet the latest requirements. They rely on gullies and pipes that transfer polluted runoff straight to expensive, underground tanks or ponds that fail to deliver amenity or biodiversity.

Design using Controflow® chambers avoids loss of valuable, usable space and the costs of large, heavily engineered control and storage structures at the perimeter of developments. Their low cost and shallow construction enable Controflow® chambers to be used more widely to manage flows at source, within each sub-catchment, and as part of the management train, as well as at site perimeters, whilst keeping water flow on or near the surface.

Controflow® chambers are essential for SuDS to demonstrate agreed flow rates to regulators and to optimise spatial efficiency of SuDS features, minimising the loss of usable space in development. They can also enable SuDS (notably permeable paving) on sloping sites, offer protection to downstream drainage assets and detain water to optimise ground infiltration, so reducing discharge volumes. All orifice flow controls should be protected to prevent debris from entering the chamber, either with pre-filtering SuDS components, such as permeable paving, or Controflow® SuDS inlet/outlet and surface conveyance systems.



Meeting the latest SuDS requirements, controlling the flow with Controflow® enables source control, sub-catchments and management trains, near the surface without additional land-take.

Demonstrating SuDS Benefits

To demonstrate the government's approach to mandatory SuDS, Defra's January 2023 report cited Lamb Drove in Cambridgeshire as an exemplar. This monitored SuDS demonstration project covers a 35 homes development on 1-hectare compared with a similar, neighbouring development using piped drainage. Completed in 2006, it was one of the first housing projects in England with integrated SuDS and included Controflow® chambers – still performing well today.



Another housing project, this time in Stamford, takes a similar approach – but applied to a high-density urban scheme with 104-units per hectare. Here, defined sub-catchments optimise available space for multifunctional SuDS with permeable pavements also accepting runoff from impermeable paving and roofs. Controflow® chambers ensure a gradual flow of clean water into planted rills and canals adding interest and greenery to the courtyard environment. Nature-based SuDS with flow controls enables 'source control' with amenity and biodiversity benefits along the management train.





Support for SuDS Designers

SuDSstore provides expert Design Support from the inception of your SuDS scheme.

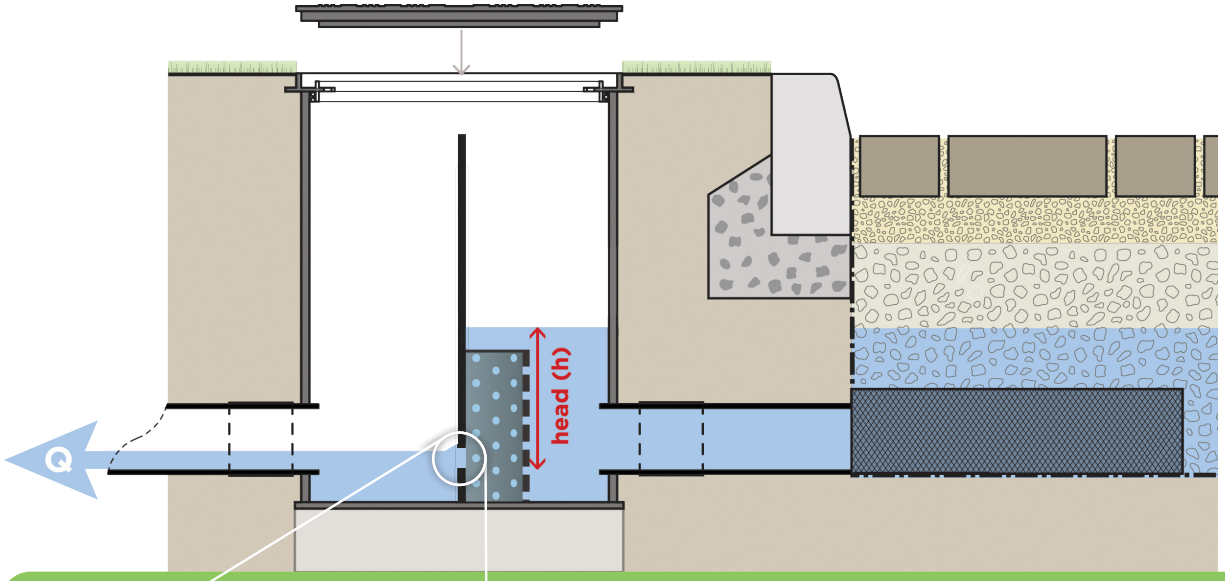
'The SuDS Approach', expected to form the basis of statutory standards for England, requires flow controls to achieve Source Control, create Sub-catchments and maximise the benefits of the Management Train.

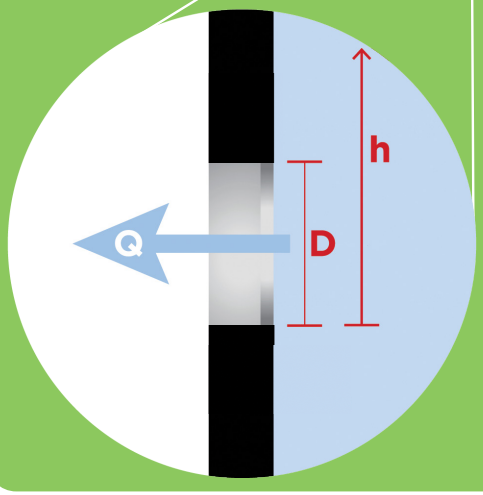
SuDSstore offers support for SuDS designers on the use of the Controflow range of flow controls in their schemes. This service includes help with product selection, orifice sizing, specification, scheduling and long-term operation.

As further design support, SuDSstore can provide individual Sub-Catchment analysis (attenuation volumes and pass forward flow rates) on a site-specific basis using bespoke software to help with the selection process for the appropriate Controflow chambers.

The Controflow® orifice design is based on well-established flow rate performance characteristics using the standard orifice equation shown below. The Controflow® orifice profile is recognised as delivering a standard 0.65 coefficient of discharge irrespective of orifice size.

The performance of Controflow® mimics the gradual response of natural drainage particularly during short duration or low intensity rainfall. Full flow characteristics operate once the storage depth provides the designed 'hydraulic head'.





$$Q = Cd(\tfrac{1}{4}\pi D^2)\sqrt{2gh}$$

where:

Q = specified flow rate (orifice discharge rate - l/s)
h = hydraulic head (m)
D = resulting orifice diameter (mm)
Cd = coefficient of discharge (the standard 0.65 applies to all Controflow® orifices)
g = gravitational constant (9.80665m/s²)

A simple to use, interactive orifice calculator is available at
www.sudsstore.com

Selecting Flow Controls

Controflow® products are specifically designed for all types of shallow SuDS elements with low flow rates, whether new-build or retrofit. Use the Product Selector Table to identify typical SuDS Applications and specific product features. In addition, bespoke products can be developed to suit specific requirements and options including foul air traps or dual-wall chambers for concrete infill are available.

Level or Stepped Inverts?

If the discharge route for runoff is through a series of 'green infrastructure' features at or near the surface – like filter strips, filter drains, swales, basins, wetlands, ponds and bioretention raingardens – then flow controls will need to be shallow, accessible and restrict flows to low flow rates. A level invert arrangement is needed so that inlets into subsequent SuDS features are above final storage levels to maximise storage in open SuDS features and reduce risk to people using the SuDS landscape.

Where the discharge route is to the storm sewer or combined sewer – particularly in SuDS retrofit – and the sewer is significantly below the adjacent construction surface, then a stepped invert should be selected to provide cover and avoid unnecessary encasement of pipe outlets to the sewer system.

Guarded or Unguarded Orifices?

All openings in drainage systems are at risk from blockage irrespective of the size of the opening. However, Controflow® orifice openings regularly go down to 10mm and in more than 20 years there has not been one report of blockage.

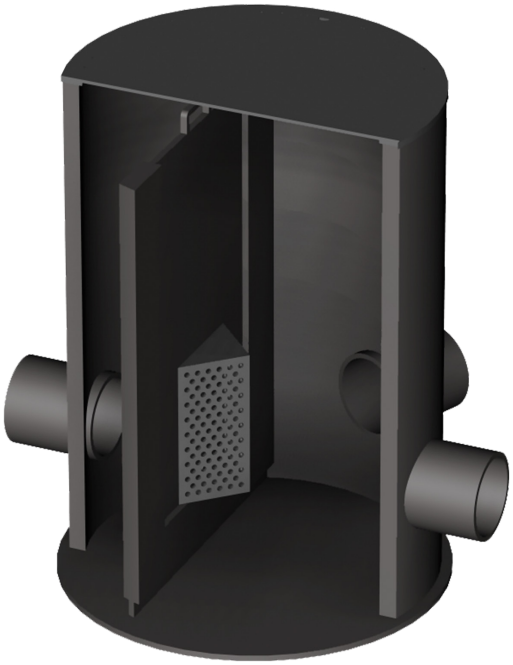
Permeable paving and filter drains themselves provide complete upstream protection to the flow control orifice and orifice guards are therefore unnecessary. In contrast, open 'green infrastructure' features rely on a combination of vegetation to trap debris that is heavier than water, including silt, and Controflow® SuDS inlet/outlet and surface conveyance systems with stone fill help to prevent floating debris entering the flow control chamber. In addition, flow controls with an integral upstream orifice guard are recommended.

Applications	**Universal** SUDS02005	**Mini** SUDS01111	**Micro** SUDS01001	**Domestic** SUDS01101	**Housing** SUDS02008	**Commercial** SUDS03001	**Combi** SUDS02009
Permeable paving	●	●	●	●	●	●	●
Green infrastructure	●						●
Filter drains	●		●				●
Attenuation tanks	●			●			●
Site outfalls or general drainage	●						●
Features							
Level inverts	●	●	●				●
Stepped inverts				●	●	●	
Integral overflow	●	●			●	●	●
110mm connections	●	●	●	●	●		●
160mm connections	●					●	●
Guarded orifice	●			●	●	●	●
Outfalls to combined sewer							●

Controflow Universal

SUDS02005

Applications: all SuDS elements, particularly those that do not provide filtration for orifice protection and at the end of the management train.



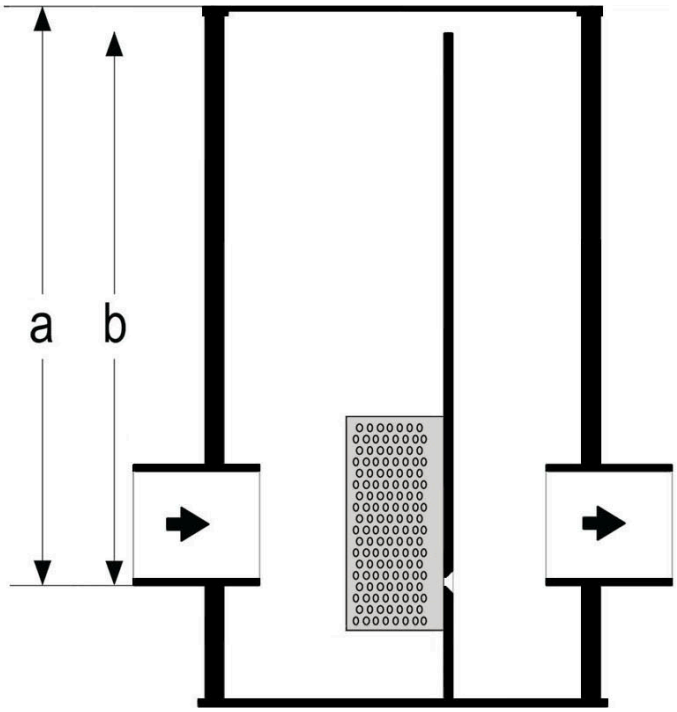
The Controflow® Universal 500mm features a slide-out plate with guarded orifice and weir overflow. Suitable for all SuDS elements, it offers design flexibility, with 110mm or 160mm pipe connections, for depths up to 1.2m.

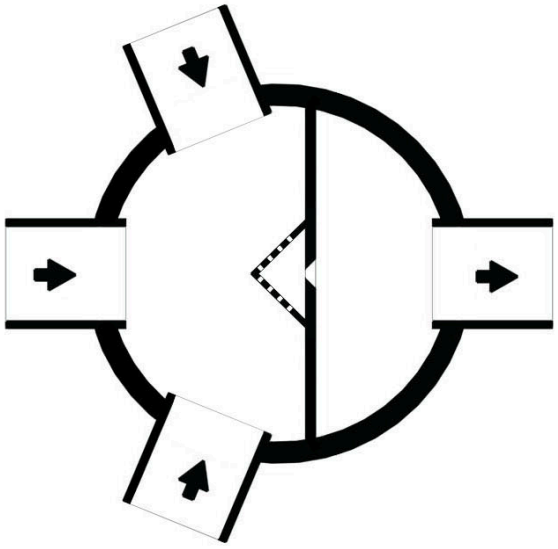
A flexible, universal flow control chamber suitable for any SuDS technique, with level inverts. The slide-out centre plate contains a circular orifice (to specified diameter), protected by an upstream guard, and acts as an overflow weir. Additional orifices can be added to order.

Three 160mm diameter inlet pipe connection stubs offer layout flexibility. Supplied with a temporary protective site cover (permanent cover and frame not included). Suitable for depths ranging from 537mm to 1.2m (finished cover to base). The chamber is fully compatible with 'Cloud Water Control' wireless SuDS monitoring systems to remotely monitor live and historical stormwater performance.

Please specify:

- Cover to inlet depth 'a'
- Weir to inlet depth 'b' (Head Driving Flow)
- Type/depth of cover/frame to be used
- Any additional orifice positions and diameters
- Orifice diameter

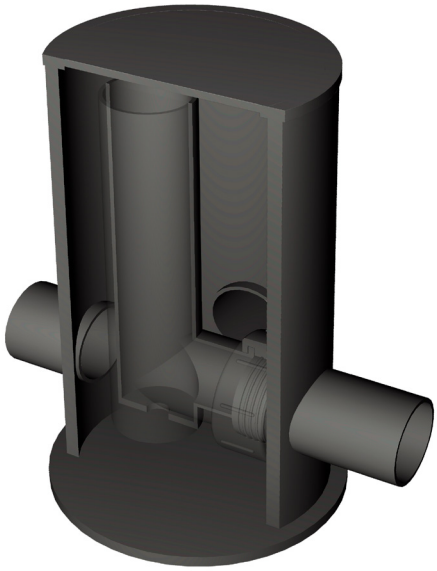




Controflow Mini

SUDS01111

Applications: permeable paving, shallow underground storage structures or where haunching or other underground obstruction prevents the use of the shallow Micro level invert chamber.



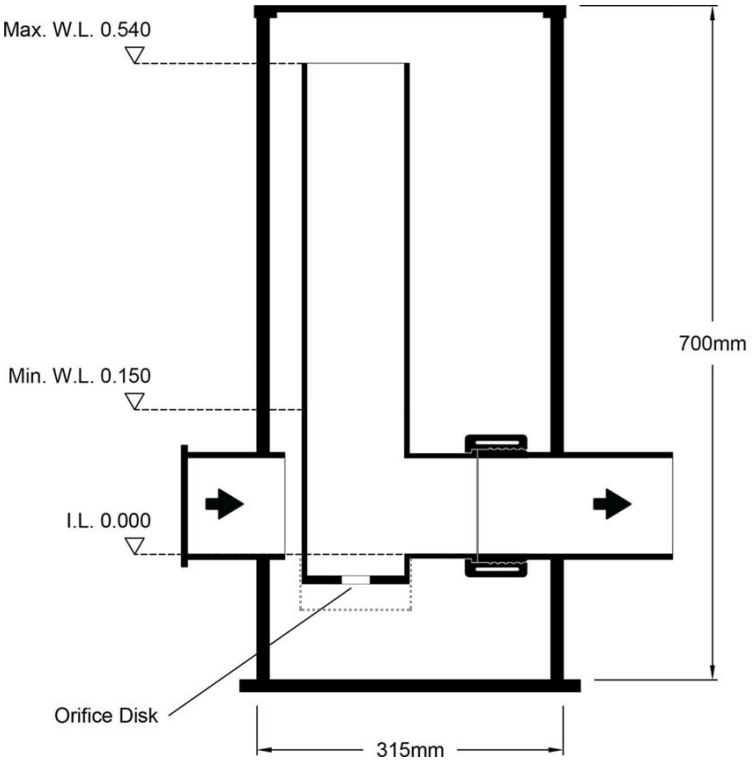
The Controflow® Mini 315mm offers simple, cost-effective intermediate flow control for small sub-catchments. Suitable for filtering SuDS elements, notably permeable paving, it incorporates 110mm pipe connections including an overflow, for depths up to 700mm (min. 330mm).

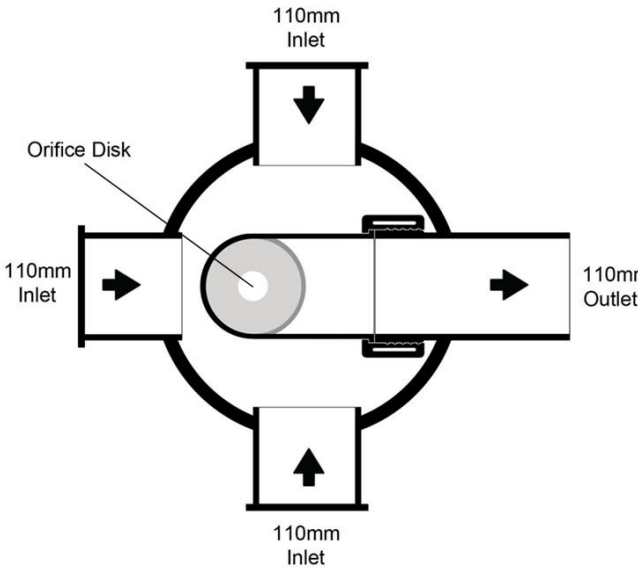
A standardised shallow flow control chamber with an un-guarded single orifice to specified diameter (optional stainless steel 10mm mesh guard available), designed to manage outflows from permeable paving or other filtering SuDS elements. Its design assumes that the 'protected orifice principle' is provided upstream in the SuDS feature, to prevent blockage of the flow control chamber by silt or other debris.

The small size and low cost enable multiple Controflow® Mini chambers to be deployed for simple intermediate flow control throughout management trains, such as check dams between permeable paving compartments. A Controflow® Universal chamber should be used as the final flow control in any sequence of SuDS features.

A particular benefit of the Controflow® Mini is the presence of a 100mm pipe overflow in the event of surcharge during exceptional rainfall. The orifice/overflow unit can be disconnected (by hand operation of the screw-collar) and removed for annual inspection or cleaning, also enabling access to the discharge pipe. Three 110mm diameter inlet pipe connection stubs offer layout flexibility. Manufactured with a depth of 700mm, the chamber (and overflow pipe to suit) can be cut on site or at the factory to order, as required. Supplied with a temporary protective site cover (permanent cover and frame not included).

Please specify:
- Orifice diameter

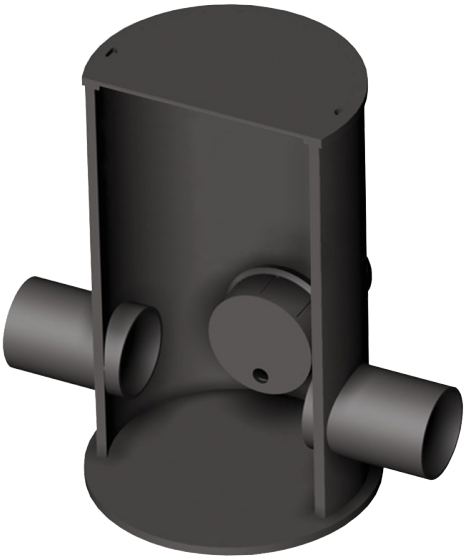




Controflow Micro

SUDS01001

Applications: permeable paving, filter drains and other shallow SuDS elements.



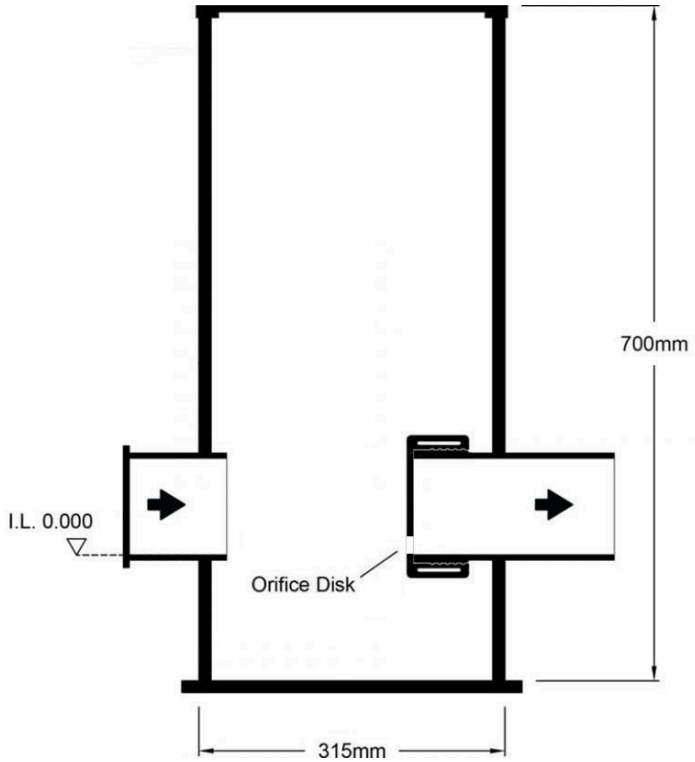
The Controflow® Micro 315mm offers simple, cost-effective intermediate flow control for small sub-catchments. Suitable for filtering SuDS elements, notably permeable paving, it incorporates 110mm pipe connections for depths up to 700mm.

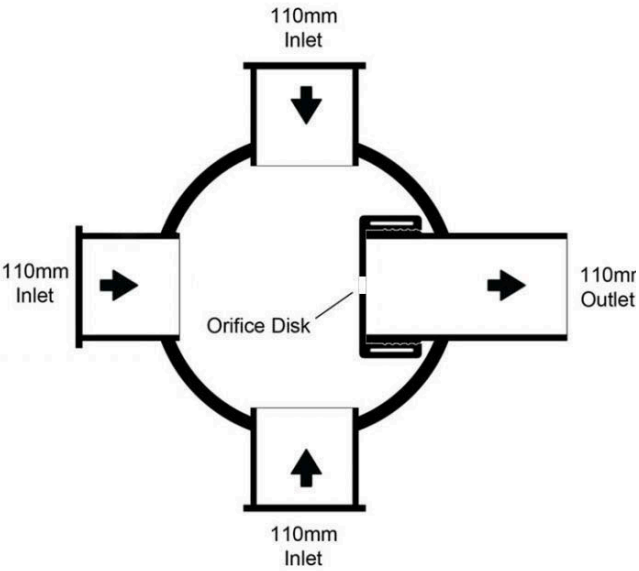
A standardised shallow flow control chamber with an un-guarded single orifice (to specified diameter), designed to manage outflows from permeable paving or other filtering SuDS elements. Its design assumes that the 'protected orifice principle' is provided upstream in the SuDS feature, to prevent blockage of the flow control chamber by silt or other debris.

The small size and low cost enable multiple Controflow® Mini chambers to be deployed for simple intermediate flow control throughout management trains, such as check dams between permeable paving compartments. A Controflow® Universal chamber should be used as the final flow control in any sequence of SuDS features.

Three 110mm diameter inlet pipe connection stubs offer layout flexibility. Manufactured with a depth of 700mm, the chamber can be cut on site or at the factory to order, as required (min 330mm depth). Supplied with a temporary protective site cover (permanent cover and frame not included).

Please specify:
- Orifice diameter

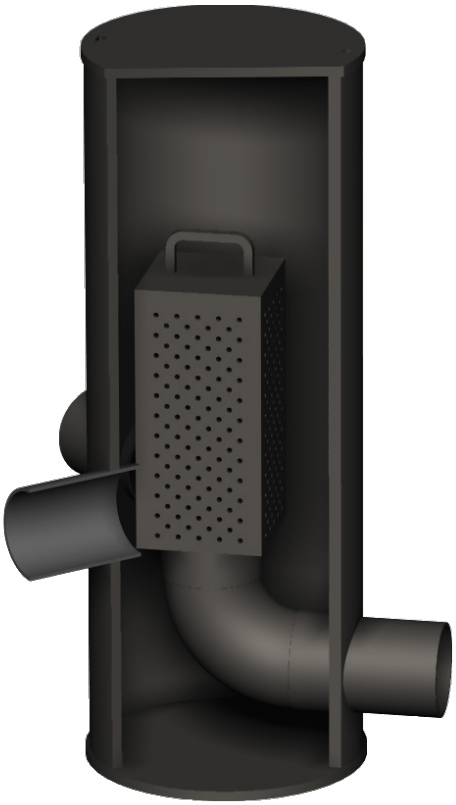




Controflow Domestic

SUDS01101

Applications: permeable paving, shallow underground storage structures or where haunching or other underground obstruction prevents the use of the shallow Micro level invert chamber.



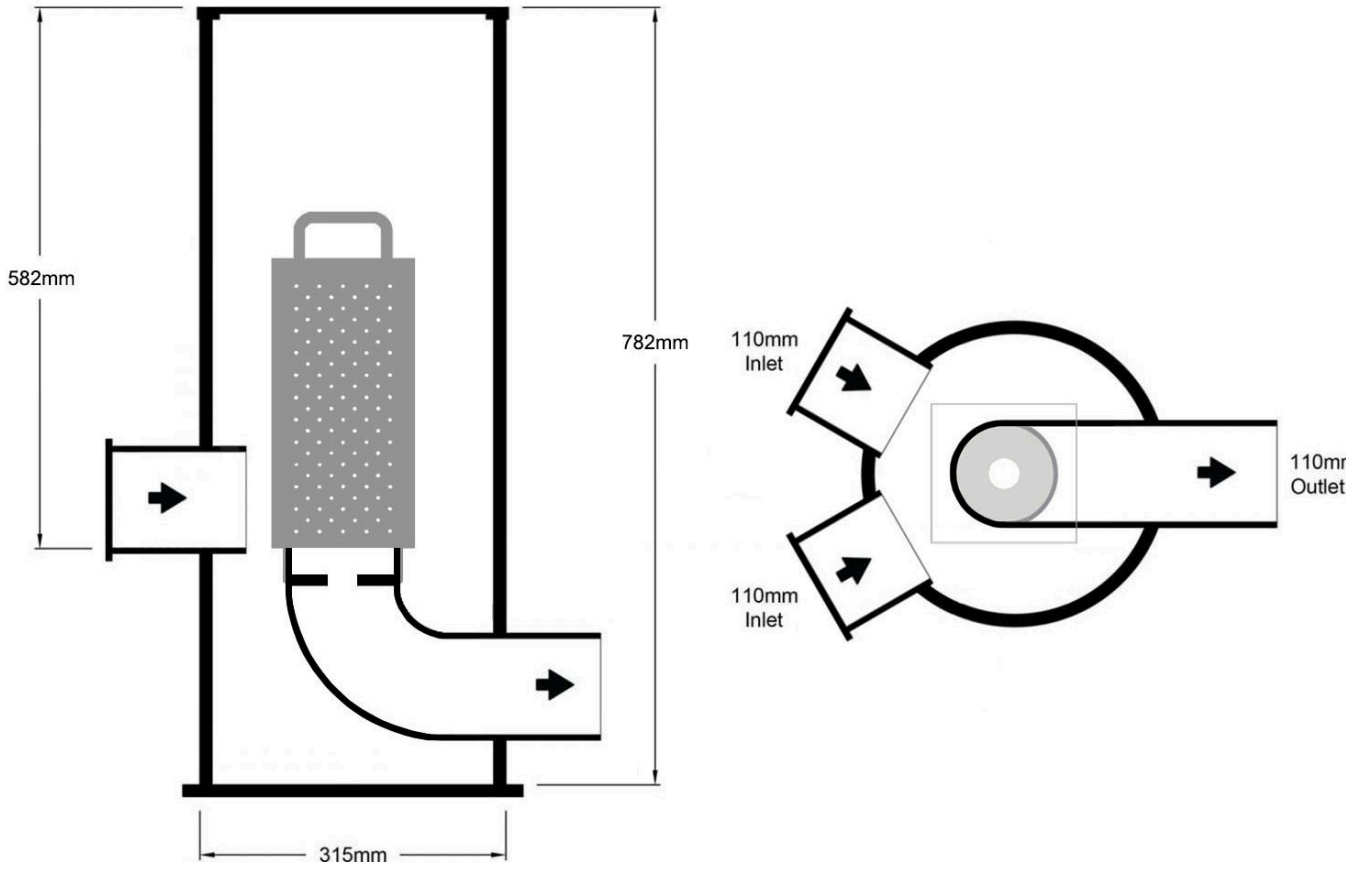
The Controflow® Domestic 315mm offers simple, cost-effective intermediate flow control for small sub-catchments. Suitable for filtering SuDS elements, notably permeable paving, it incorporates 110mm pipe connections for depths up to 782mm.

A small flow control chamber with a 110mm diameter inlet and protected orifice located at the base of a removable flow control tube. The flow control tube allows access to a deeper chamber where pipe inlet depth is obstructed by other construction factors like kerb haunching or existing pipe work.

The removable flow control tube is perforated to protect the orifice in the base of the tube. The handle to the tube provides access by hand for inspection and cleaning. This product does not incorporate an internal overflow (if required, use Controflow® Mini or Universal).

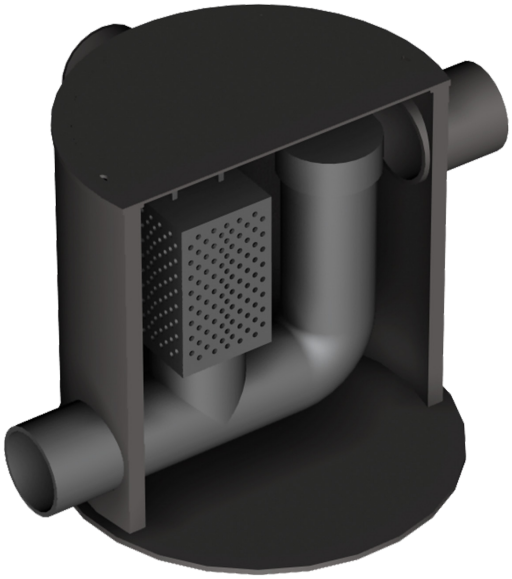
Two 110mm diameter inlet pipe connection stubs offer layout flexibility. Supplied with a temporary protective site cover (permanent cover and frame not included).

Please specify:
- Orifice diameter
- Depth of cover/frame to be used



Controflow Housing

SUDS02008



Applications: commercial permeable paving.

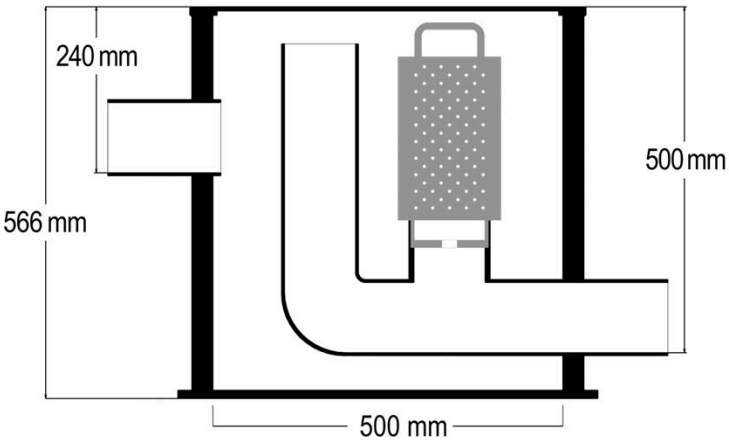
The Controflow® Housing 500mm offers simple, cost-effective intermediate flow control for larger sub-catchments. Suitable for filtering SuDS elements, notably permeable paving, it incorporates 110mm pipe connections for depths up to 566mm.

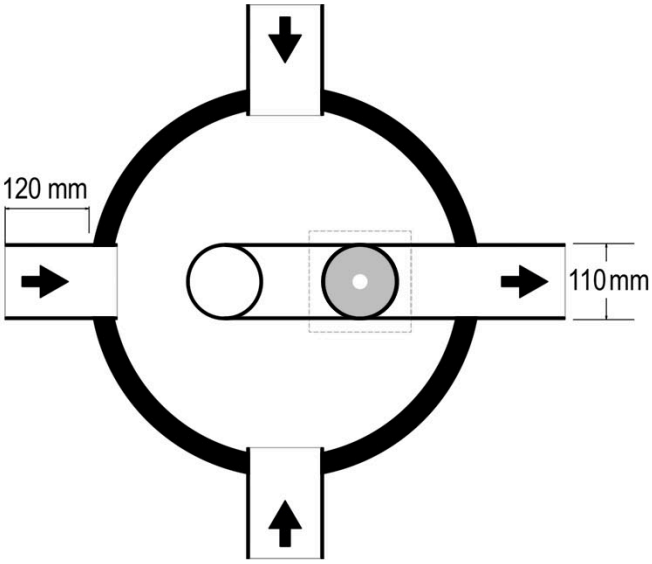
A standard flow control chamber with a single, guarded orifice (to specified diameter), designed to manage outflows from permeable paving or other open graded sub-base construction. Stepped inverts simplify the construction of transitions from shallow permeable paving to deeper constructions.

The protective guard and orifice cap are removable, and the rodding access upstand can act as an overflow with its cap removed. Three inlet pipe connection stubs offer layout flexibility. Supplied with a temporary protective site cover (permanent cover and frame not included).

Bespoke flow control chambers can be manufactured to suit specific requirements.

Please specify:
- Orifice diameter

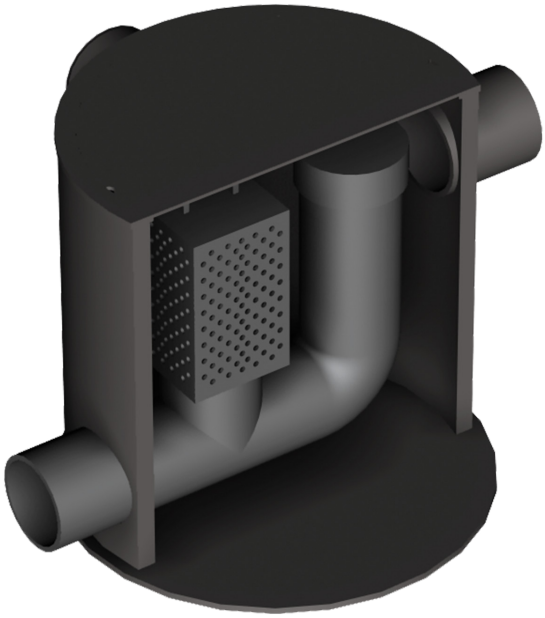




Controflow Commercial

SUDS03001

Applications: commercial permeable paving.



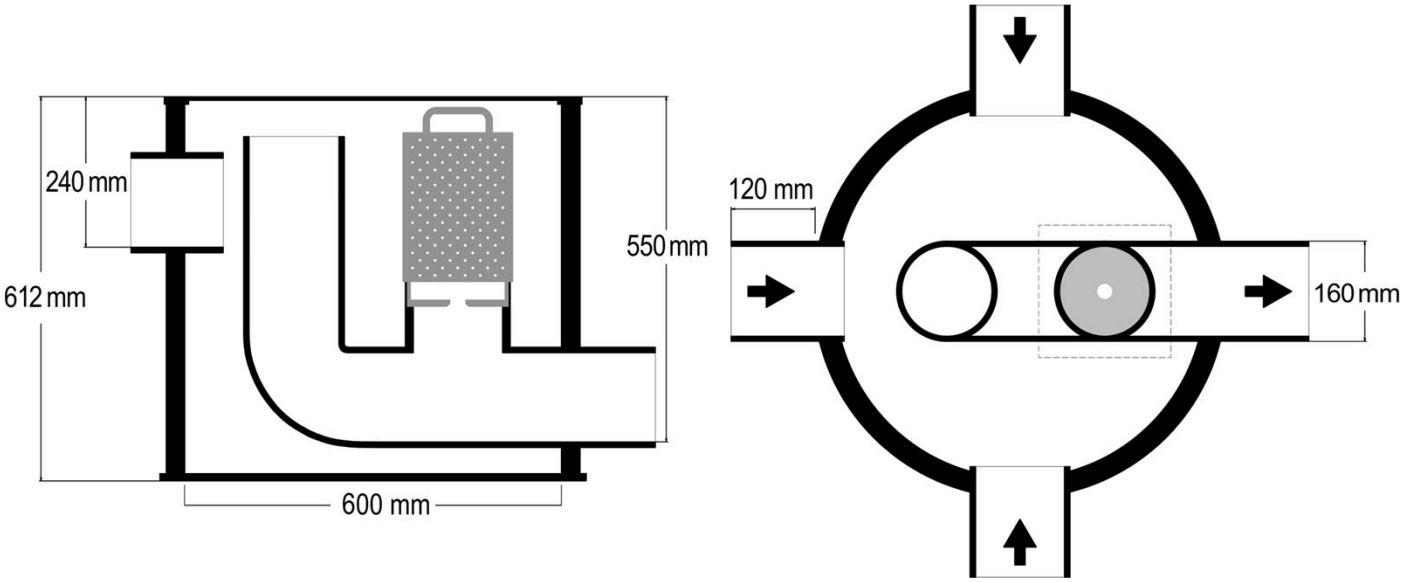
The Controflow® Commercial 600mm offers simple, cost-effective intermediate flow control for large sub-catchments. Suitable for filtering SuDS elements, notably permeable paving, it incorporates 160mm pipe connections for depths up to 612mm.

A standard flow control chamber with a single, guarded orifice (to specified diameter), designed to manage outflows from permeable paving or other open graded sub-base construction. Stepped inverts simplify the construction of transitions from shallow permeable paving to deeper constructions.

The protective guard and orifice cap are removable, and the rodding access upstand can act as an overflow with its cap removed. Three inlet pipe connection stubs offer layout flexibility. Supplied with a temporary protective site cover (permanent cover and frame not included).

Bespoke flow control chambers can be manufactured to suit specific requirements.

Please specify:
- Orifice diameter



Controflow Combi

SUDS2009

Applications: for connecting SuDS features to combined sewers, such as retrofit raingardens and at the end of the management train.

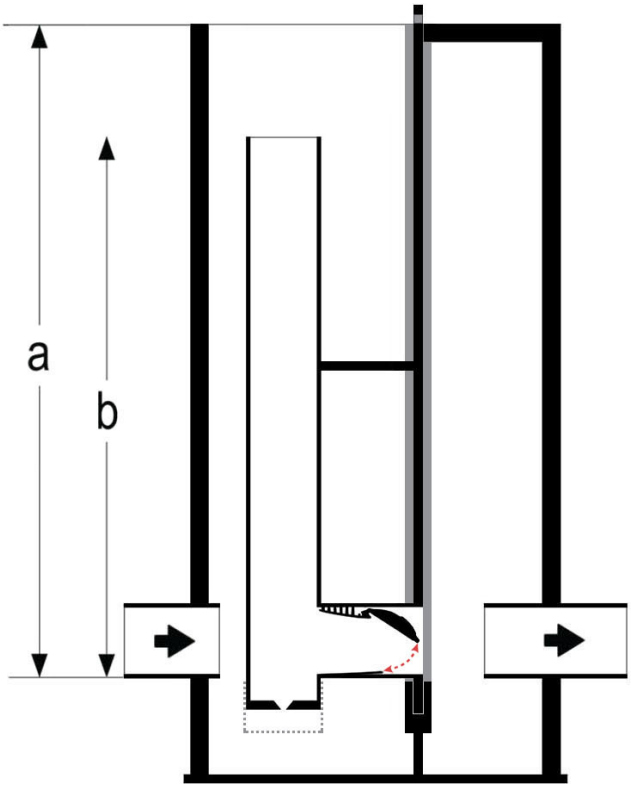
The Controflow® Combi 500mm features a slide-out plate with orifice and a non-return valve. For connections to combined sewers, it offers design flexibility, with 110mm or 160mm pipe connections, for depths up to 1.2m.

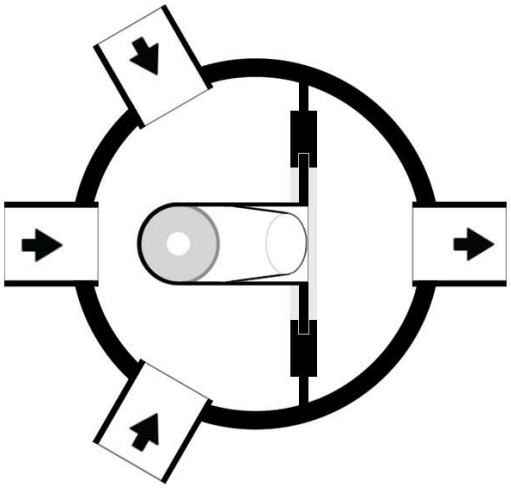


The Controflow® Combi is a flexible flow control chamber specifically for connection of SuDS features and site outfalls to combined sewers. The slide-out centre plate assembly includes a vertical pipe with an orifice control (optional stainless steel 10mm mesh guard available) and overflow, protected by a non-return valve outlet.

Three inlet pipe connection stubs, either 110mm or 160mm diameter, offer layout flexibility. Supplied with a temporary protective site cover (permanent cover and frame not included). An optional foul air trap is available for use when connected to combined sewers. The chamber is fully compatible with 'Cloud Water Control' wireless SuDS monitoring systems to remotely monitor live and historical stormwater performance.

Please specify:
- Cover to inlet depth 'a'
- Weir to inlet depth 'b' (Head Driving Flow)
- Type/depth of cover/frame to be used
- Orifice diameter





Controflow SuDS Baskets

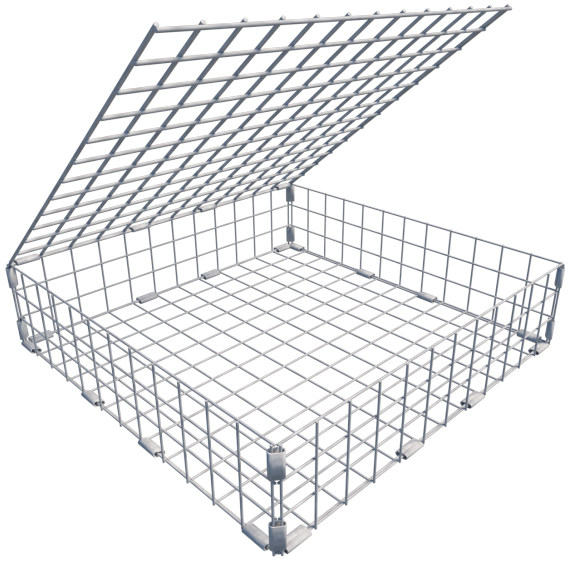
Controflow SuDS Baskets are used in combination to create attractive, nature-based inlet/outlet, enviro-headwall and surface conveyance systems. Designed for use within landscaped SuDS features such as swales, ponds and basins, they minimise erosion and protect orifice flow controls from blockage.

They are manufactured from stainless steel mesh, for extremely long-life with negligible maintenance, Each basket is supplied flat with crimp clips and, where appropriate, a geotextile liner for the sides, base and also as a temporary surface cover. Technical and Installation guidance is available via sudsstore.com

Controflow Conveyance

As a nature-based alternative to unsightly and expensive engineered aprons and cascades or pipework, Controflow Conveyance Baskets enable diffuse water flows down slopes to avoid erosion.

The shallow baskets are wrapped in geotextile (to avoid 'short-circuiting' of flows), then simply laid directly onto subsoil and are designed for filling with 80mm - 150mm stone (supplied by others).

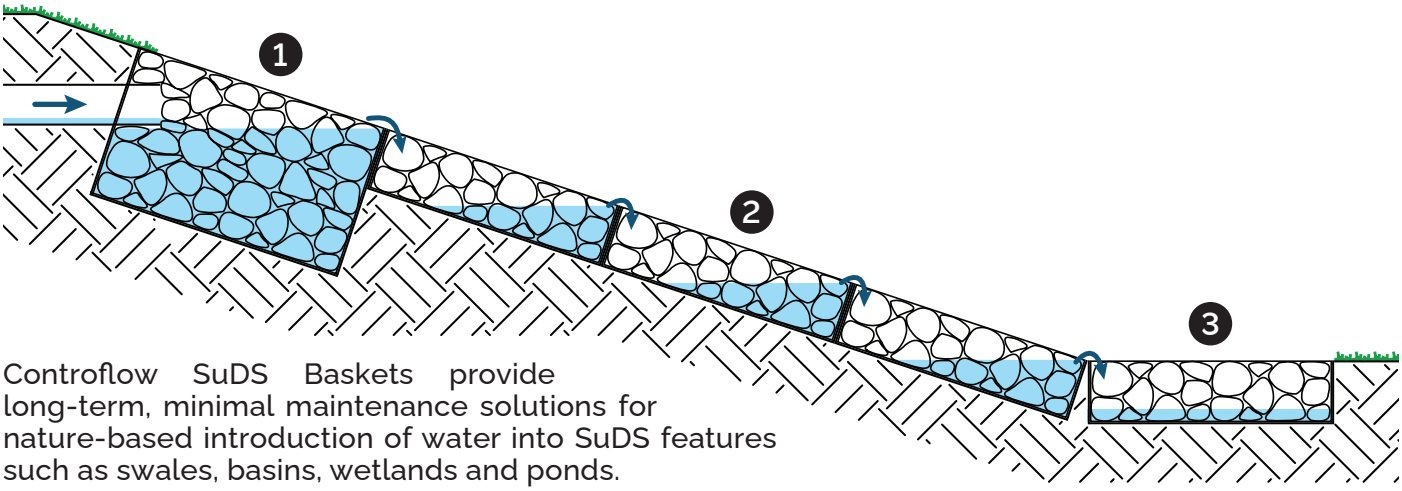


600x600x150mm SUDS08100



* Stone infill sold separately

600x300x150mm SUDS08101



Controflow SuDS Baskets provide long-term, minimal maintenance solutions for nature-based introduction of water into SuDS features such as swales, basins, wetlands and ponds.

1. Suitable inlets include Controflow Inlet Baskets and Enviro-Headwalls, as well as road-inlets or conventional headwalls
2. Geotextiles attenuate water within each basket and avoid bank erosion
3. Flow dispersal baskets at the base protect natural surroundings

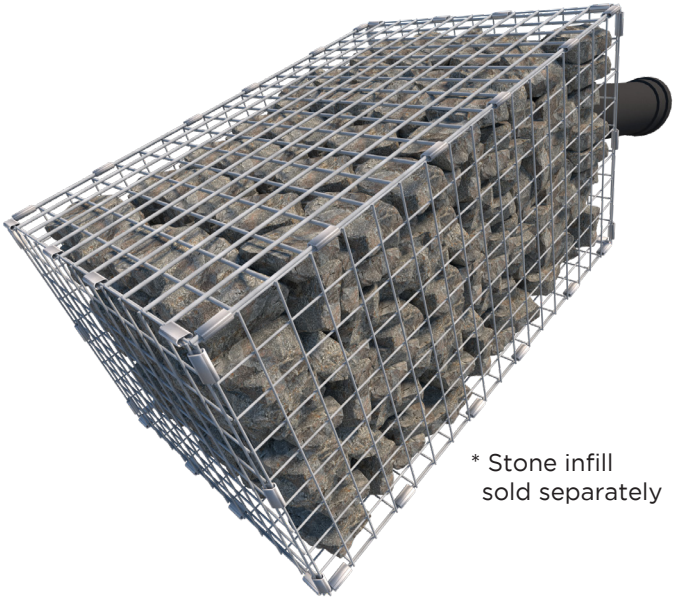
Controflow Inlet/Outlets

As a nature based alternative to headwalls, Controflow Inlet/Outlets protect the pipe entry from debris and vandalism, as the pipe is invisible and inaccessible. Designed for filling with 80mm - 150mm stone (supplied by others). A mesh pipe cap is included.

Please specify:
- Pipe diameter



750x600x450mm SUDS08401
– ideally suited to 100mm pipe

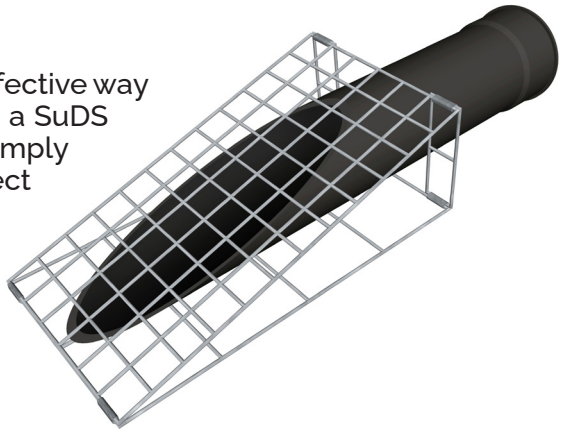


* Stone infill sold separately

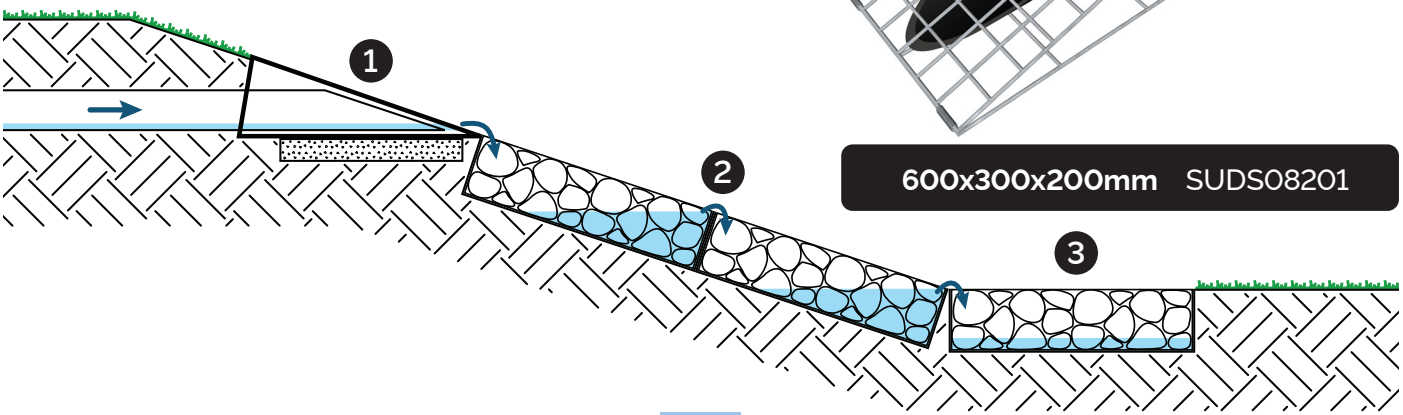
900x600x450mm SUDS08402
– ideally suited to 150mm pipe

Controflow Enviro-Headwalls

The Controflow enviro-headwall triangular basket is a cost-effective way to discharge clean water from a Controflow flow control into a SuDS feature via a Controflow conveyance system. They are simply placed on a locating/levelling slab and folded over to protect the cut inlet pipe, then filled with soil.



600x300x200mm SUDS08201



Controflow Product Selector

Applications	Universal SUDS02005	Mini SUDS01111	Micro SUDS01001	Domestic SUDS01101	Housing SUDS02008	Commercial SUDS03001	Combi SUDS02009
Permeable paving	●	●	●	●	●	●	●
Green infrastructure	●						●
Filter drains	●		●				●
Attenuation tanks	●			●			●
Site outfalls or general drainage	●						●
Features							
Level inverts	●	●	●				●
Stepped inverts				●	●	●	
Integral overflow	●	●			●	●	●
110mm connections	●	●	●	●	●		●
160mm connections	●					●	●
Guarded orifice	●			●	●	●	●
Outfalls to combined sewer							●