

Report Title

Operational Drainage Management Plan

Property Address

Joe McBain Avenue
Moresby Parks
Whitehaven
CA28 8EA

Client

Energy Coast Property Services

Our Reference

24-471r004

Date

November 2024

Prepared by

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INTRODUCTION

This Operational Drainage Management Plan has been prepared to support the development of a warehouse and associated infrastructure on land at Joe McBain Avenue, Moresby Parks.

The site lies within the administrative boundary of Cumberland Council (CC) and is currently subject to a planning application ref 4/23/2085/0F1.

This report identifies necessary maintenance measures to ensure drainage systems operate in accordance with the requirements of all statutory bodies and prevent potential effects upon the environment and nearby sensitive receptors during the operational phase of the development.

SITE

The site comprises of the development of buildings for Class B2 & B8 Planning Category. The works include :

- Warehouse/Office
- External yard and infrastructure
- Landscaping and fencing

OPERATIONAL ACTIVITIES WHICH MAY POLLUTE

ACTIVITIES

The following operational activities are assessed as having a likelihood to pollute :

- Maintenance works to the property.

All activities shall be undertaken on site by the operator of the site, and shall be covered by suitable method statements and risk assessments produced by the operator and users.

ENVIRONMENTAL PROTECTION MEASURES

There are a number of environmental protection measures proposed for the site. These include:

- Surface Water - Attenuation / Storage
- Surface Water - Hydrobrake

Full operational manuals are appended to this report.

MAINTENANCE ACTIVITIES

The following tables relate to the maintenance requirements to drainage installed on the site and all works required to them..

#	Description	Frequency
1.	GENERAL REQUIREMENTS	
	Maintenance activities comprise <ul style="list-style-type: none"> ● Regular Maintenance ● Occasional Tasks ● Remedial Work 	
	<u>Generally</u>	
	Litter Collect all litter or other debris and remove from site at each site visit.	Monthly
2.	FILTER DRAINS AND INFILTRATION TRENCHES	
	<u>Regular Maintenance</u>	
	Grass Edges Mow 1m min. wide grass surround to drain at 100mm and 150mm maximum to filter runoff and protect drain from silt.	Monthly or as required
	<u>Occasional Tasks</u>	
	Weeds Hand pull or spot treat individual weed growth only if necessary ensuring weedkiller does not enter the filter drain. Weed growth usually dies in dry weather.	As required
	<u>Remedial Works</u>	
	Siltation at Surface Where there is no protective geotextile remove all stone and perforated pipe replacing as original Spec. and include separating geotextile as below.	As required

#	Description	Frequency
	Where there is a separating geotextile (see Spec.) then remove surface stone layer and separating geotextile that protects the stone drain below. Replace geotextile and top stone layer.	As required
3.	INFILTRATION DEVICES SOAKAWAYS, INFILTRATION TRENCHES AND INFILTRATION BASINS	
	<u>Occasional Tasks</u>	
	<p>Infiltration Basins</p> <p>Where there is a build up of silt in basis at intels, i.e. 50mm or more above the design level then remove when the ground is damp in autumn or early spring and turf to the original design levels.</p> <p>Spread excavated material on site above SuDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.</p> <p>Infiltration Trench</p> <p>Hand pull or spot treat individual weed growth only if necessary, ensuring weedkiller does not enter the drain and inhibit breakdown of pollutants.</p>	<p>As required</p> <p>As required</p>
	<u>Remedial Works</u>	
	<p>Infiltration Basin</p> <p>Where the infiltration basin is compacted then reinstate by removal of silt and decompaction of the surface by scarifying, spiking or the use of hollow tines to the basin area.</p>	As required
4.	INLETS, OUTLETS, CONTROLS, AND INSPECTION CHAMBERS	
	<u>Regular Maintenance</u>	
	<p>Inlets, outlets and surface control structures</p> <p>Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage.</p> <p>Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris</p>	<p>Monthly</p> <p>Monthly</p>

#	Description	Frequency
	<p>Inspection chambers and below ground control chambers</p> <p>Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.</p> <p>Undertake inspection after leaf fall in autumn.</p>	Annually
	<p><u>Occasional Maintenance</u></p>	
	<p>Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage</p>	As necessary
	<p><u>Remedial Work</u></p>	
	<p>Unpack stone in basket features and unblock or repair and repack stone as design as necessary.</p> <p>Repair physical damage if necessary.</p>	<p>As required</p> <p>As required</p>
5.	<p>OVERFLOWS AND FLOOD ROUTES</p>	
	<p><u>Regular Maintenance</u></p>	
	<p>Overflows</p> <p>Jet pipes leading from overflow structures annually and check by running water through the overflow. Check free flow at next SUDS feature - inlet to basin or chamber.</p>	Annually
	<p>Overflows</p> <p>Remove any accumulated grass cuttings or other debris on top of grass weirs or stone filled baskets overflows.</p>	Monthly
	<p>Flood Routes</p> <p>Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary.</p>	Monthly
	<p><u>Remedial Works</u></p>	
	<p>Overflows</p> <p>If overflow is not clear then dismantle structure and reassemble to design detail.</p>	As required

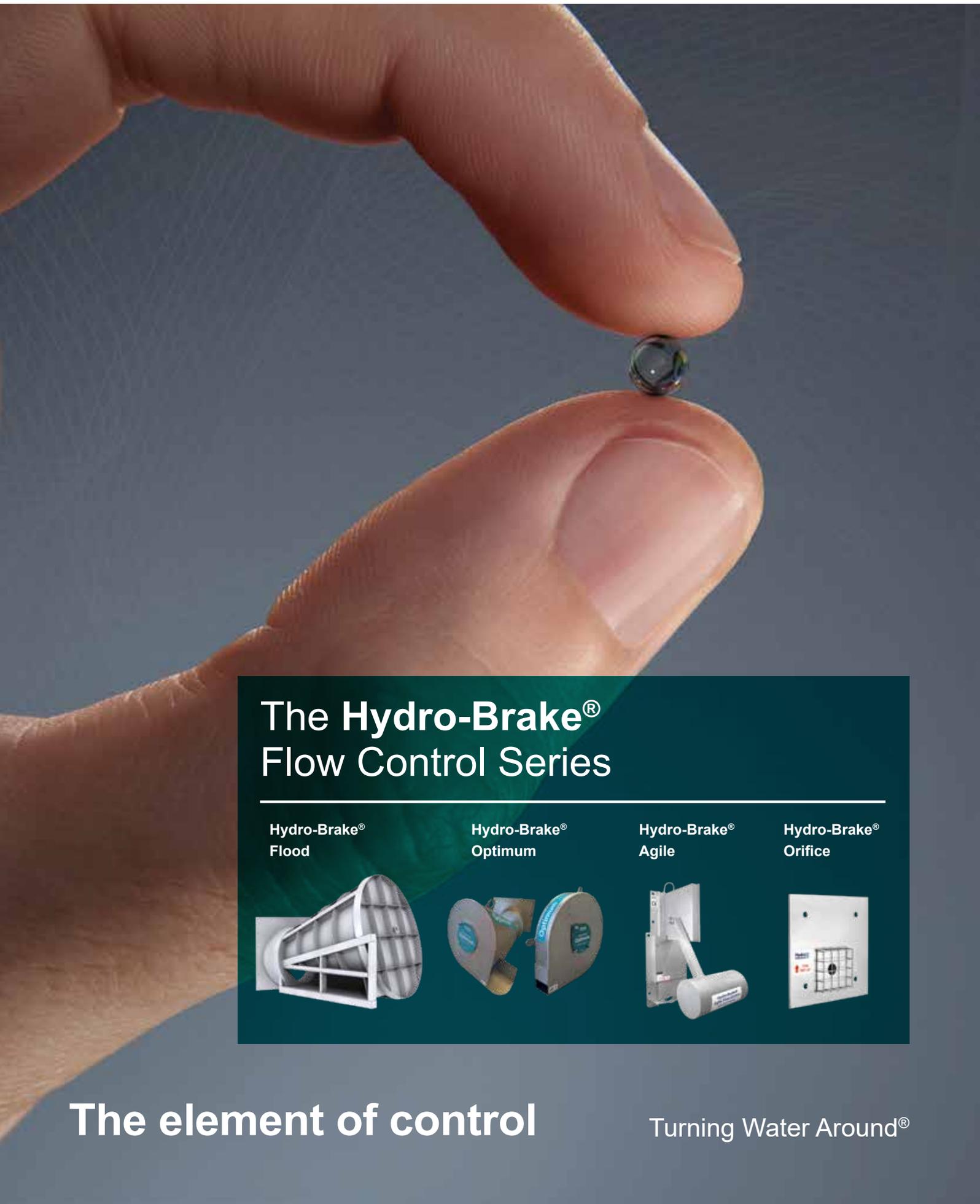
#	Description	Frequency
6.	ORNAMENTAL PLANTING AND EXISTING VEGETATION	
	<u>Regular Maintenance</u>	
	Grass Maintenance Amenity Grass - Mow all grass verges, paths and amenity grass at 35-50mm with 75mm max. All cuttings to remain in situ.	16 visits
	Rough grass - Mow at 75-100mm but not to exceed 150mm. All cuttings to wildlife piles.	4-8 visits
	Wildflower areas strimmed to 50mm in September-October or Wildflower areas strimmed to 50mm July and September or Wildflower areas strimmed to 50mm or 3 year rotation 30% each year. All cuttings to wildlife piles	1 visit 2 visits 1 visit
	Ornamental tree and shrub planting Weed all shrub beds as detailed spec as necessary. Cut back planting from lights, paths and visibility sight lines in late autumn and as necessary. Cut hedges slightly tapered back from base with flat top at specified height. Do not mulch planting adjacent to permeable/porous paving surfaces. Remove stakes and ties from trees when no longer needed for support and within 3 years of planting. Protect from strimmer damage and remove competitive growth	4 visits

#	Description	Frequency
	until well established.	
	<p>Native trees and shrub planting</p> <p>Prune to shape in year 1.</p> <p>Protect trees from strimmer damage and remove competitive growth until well established.</p> <p>Remove stakes and ties from trees when no longer needed for support and within 3 years from planting.</p>	1 visit
	<p>Existing trees</p> <p>Check existing trees for safety.</p>	1 visit
	Remedial Works	
	<p>Replace trees and shrubs which fall in the first five years after planting.</p> <p>Carry out tree surgery as necessary</p>	

APPENDICES

Operational manuals

- Attenuation Tanks
- Hydrobrake



The Hydro-Brake® Flow Control Series

Hydro-Brake®
Flood



Hydro-Brake®
Optimum



Hydro-Brake®
Agile

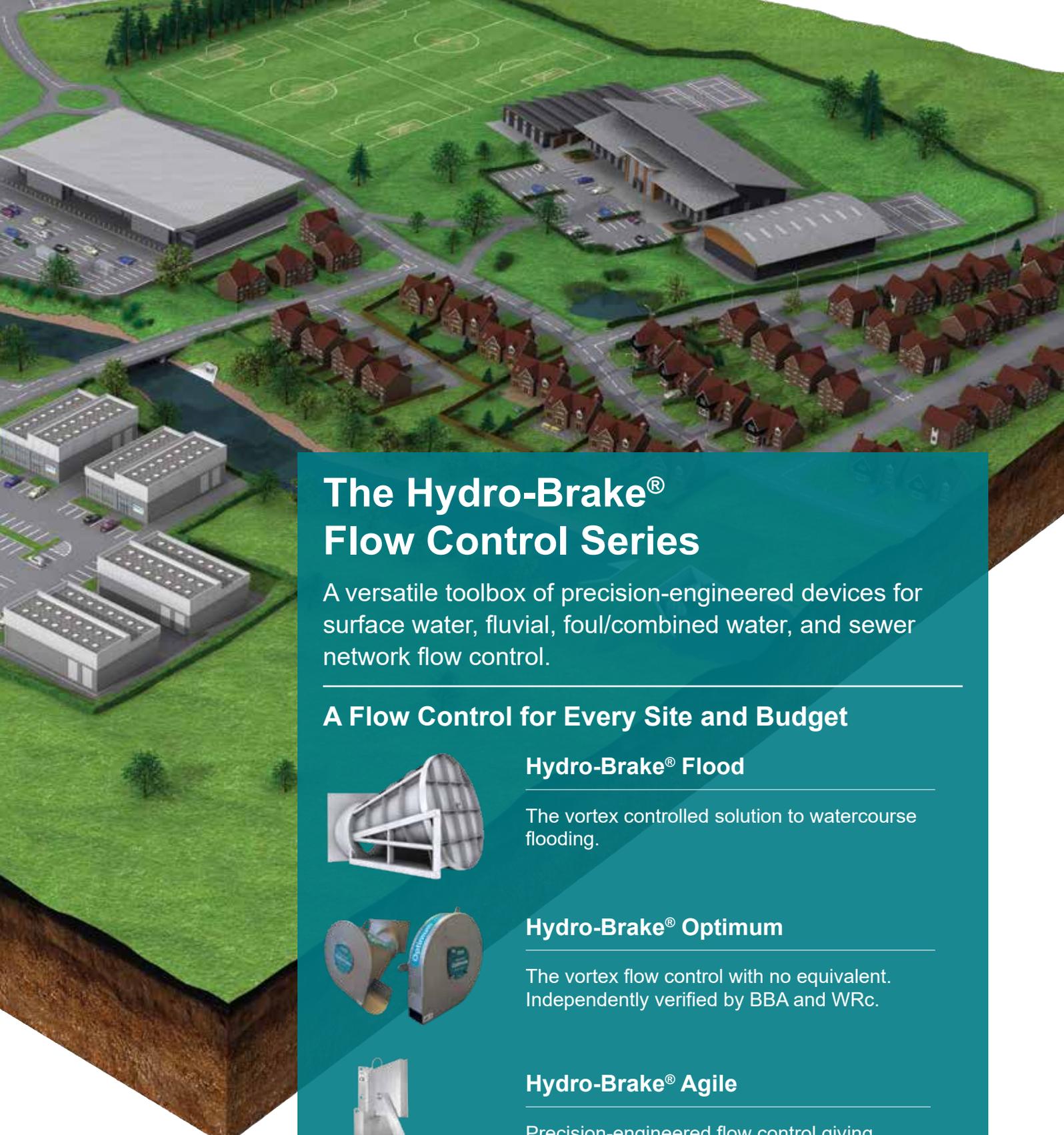


Hydro-Brake®
Orifice



The element of control

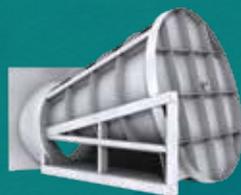
Turning Water Around®



The Hydro-Brake® Flow Control Series

A versatile toolbox of precision-engineered devices for surface water, fluvial, foul/combined water, and sewer network flow control.

A Flow Control for Every Site and Budget



Hydro-Brake® Flood

The vortex controlled solution to watercourse flooding.



Hydro-Brake® Optimum

The vortex flow control with no equivalent. Independently verified by BBA and WRc.



Hydro-Brake® Agile

Precision-engineered flow control giving reduced on-site storage for highly constrained applications.



Hydro-Brake® Orifice

The low cost option for unconstrained sites.



The Element of Control

Hydro International has set the highest standards in flow control technology during more than 40 years of specialist water engineering. When it comes to understanding, predicting and controlling the flow of water, Hydro works with scientific rigour.

Our customers are constantly challenged to deliver imaginative solutions, despite tough commercial and physical constraints. Committed to precision in product development and manufacture, we partner with you to engineer the best-possible water management solutions.

Hydro International's unrivalled knowledge and outstanding technical design support give our customers complete reassurance of system performance and value.

We give you the element of control.

Precision-Engineered for Reliable, Repeatable Performance

The Hydro-Brake® Flow Control Series offers a comprehensive choice for sustainable, performance-optimised attenuation and control whatever the project. Fully scalable and adaptable to your site conditions, there is no need to compromise on your project requirements.

All Hydro International flow controls are manufactured to the same exacting standards of quality. Tested, proven and independently accredited by regulatory bodies across the world, they offer the reassurance of reliable, repeatable performance.

Technical Design Support

Faced with increasingly varied environmental and planning stipulations, engineers need to adapt their solutions accordingly and balance flow rates with storage requirements and optimise the drainage system performance over the duration of a storm. In these circumstances, Hydro International's expert design support can advise on the correct flow control selection and design.

A full range of technical services, including detailed hydraulic modelling, easy-to-use design tools and integration into industry-standard software, all help engineers to achieve optimum hydraulic performance.

Buildable, Maintainable, Adoptable

Hydro International flow controls are designed and manufactured for ease of installation and reliable through-life performance with minimum intervention. Simple, predictable, low-maintenance regimes make them straightforward for management organisations to take on, and remove any concerns for adopting authorities.

For peace of mind and to make maintenance easier and more cost effective Hydro-Logic® Smart Maintenance can be added to any of our flow control chambers. This sophisticated sensor and telemetry package enables remote, monitoring of water levels and alerts will be triggered when abnormal water level activity is detected.

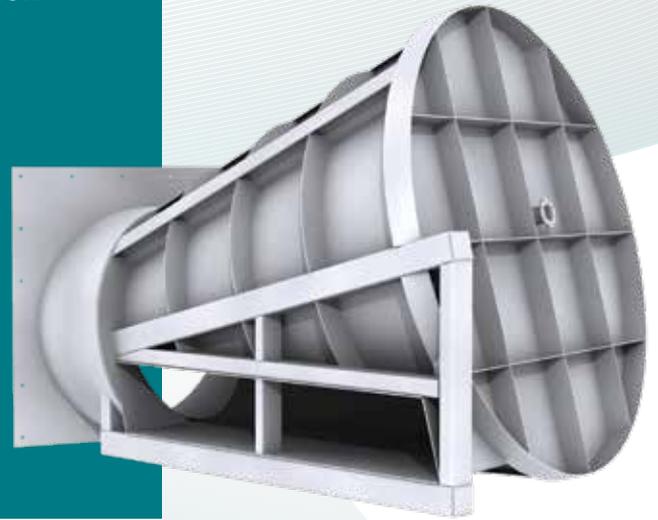
Hydro-Brake® Flood

Hydro-Brake® Flood is a highly sustainable, precision-engineered vortex technology for preventing watercourse flooding.

Hydro-Brake® Flood flow controls have been installed at the heart of low-maintenance, self-activating flood defences since the 1990s, and now protect more than 6,000 properties from an estimated £200m of flood damage in pioneering schemes across the UK.



Watercourse
flood prevention



- ✓ No external power.
- ✓ No moving parts.
- ✓ Upstream flood storage minimised.
- ✓ Minimal maintenance.

Bespoke, Precision Engineering

Each Hydro-Brake® Flood is a bespoke solution that precisely manages watercourse flows, right up to major dams with pass forward flow rates of 30 m³/s. The same technology is used just as successfully in smaller, dispersed schemes.

Each Hydro-Brake® Flood scheme is purpose-designed to optimise flow control performance characteristics and precisely calculate the amount of upstream storage required. Using Hydro-Brake® Flood vortex technology can reduce the volume of floodwater to be stored by up to 30% compared to fixed orifice controls.

A Simple, Elegant Solution

The internal geometry of Hydro-Brake® Flood is designed so that water can flow through it without restriction for as long as possible, minimising the upstream storage required. A self-activating vortex is created when the water reaches the pre-determined hydraulic head, holding back excess water, and releasing it at a controlled rate.

Expert Design and Manufacture

Designing fluvial interventions, whether on a large or small scale, requires expert engineering and hydraulic modelling in line with the flood risk management strategy. Hydro International can support with detailed design using Computational Fluid Dynamics and structural design using Finite Element Analysis, scale testing and production of detailed design drawings and specifications.

Hydro-Brake® Flood vortex flow controls are manufactured in high-grade stainless steel to be structurally fit-for-purpose, using modern production and control methods to ensure the design and performance objectives are delivered.

Low Impact, Minimal Maintenance

The Hydro-Brake® Flood has a large open area at all flow rates, resulting in a low risk of blockages. With no power or moving parts, the flow controls require minimal operational attention and maintenance.

Future-Proofed

Hydro-Brake® Flood schemes can be designed to allow for future variances in fluvial flows. A facility for future adjustment to allow for climate change can be incorporated without necessitating new engineering or construction works.

Monitoring

Flood alleviation at the fluvial level can be demonstrated to deliver a level of protection that is worth far more than the project costs. We can offer support and advice on post-installation monitoring of the value of the intervention.

Case Studies



Flood Prevention Scheme Protects 1,750 Properties in Glasgow

Glasgow City Council's £53 m White Cart Water Flood Prevention scheme protects 1,750 properties in the south of the city. Normally a shallow river, White Cart Water is prone to flash flooding. As little as twelve hours of rain can cause water levels to rise by six metres.

New manufacturing and installation techniques were developed as part of the project that saw the world's five largest-ever Hydro-Brake® Flood vortex flow controls installed in 3 dams in the highlands above the city. The final scheme controls flow rates and velocities up to a 1 in 200 year flood event, with a 45% maximum reduction in peak flows, holding back more than 2.5 billion litres of floodwater in upstream storage areas that make best use of the natural environment.



Vortex Technology Protects Northallerton Homes and Businesses

In the North Yorkshire town of Northallerton, a £3.1 million flood alleviation scheme is using Hydro-Brake® Flood technology to protect 170 homes and businesses. Two large Hydro-Brake® Flood vortex flow controls were installed in refurbished culverts on town's outskirts.

They enable excess water to be held back in specially-built flood storage basins. Before the scheme was built, excess floodwaters could overtop the watercourse in the agricultural land on its approach to the culverts sending flows to cause flooding in the east of the town. Hydro International carefully-sized the flow controls to minimise upstream storage requirements.

Hydro-Brake® Flood Selection Criteria

Suitability:	For rivers & watercourses; Flood storage reservoirs		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
550 – 12,000 *	1.5 – 10 *	n/a	Low
Moving Parts?	External Power?	Risk of blockage?	
No	No	Very low	

* higher flows and heads may be possible (contact Hydro International to discuss)

Hydro-Brake® Optimum

The Hydro-Brake® Optimum is Hydro International's flagship passive flow control device and the most advanced vortex flow control available.

Hydro-Brake® Optimum is the only vortex flow control for which the head and discharge relationship can be fine-tuned to optimise your design. Designers can size a Hydro-Brake® Optimum to achieve the perfect hydraulic performance curve and engineer the best possible passive flow control performance.



Surface water management and SuDS



Combined drainage systems and CSOs



Watercourse flood prevention



Sewer network optimisation



Wastewater treatment plants



- ✓ No external energy source.
- ✓ No moving parts.
- ✓ Future-proof.
- ✓ Large outlet clearances prevent blockages.

There is No Equivalent

Hydro-Brake® Optimum dispenses with the need to choose from a range of sizes and types and instead offers built-in flexibility to size each unit for absolute fit. Each Hydro-Brake® Optimum is individually-sized, so you achieve performance without compromise for every project.

Maximise Storage Savings

The increased hydraulic efficiency of the Hydro-Brake® Optimum means you can reduce on-site storage by up to 15% than if an alternative vortex control is used. With reduced storage, you can lower construction and excavation costs as well as saving project time and overall land-use.

Best Value for Every Project

Selecting the superior performance of Hydro-Brake® Optimum does not mean a higher cost for your project. On the contrary, because your upstream storage can be fine-tuned to achieve the smallest volumes, construction, excavation and material costs are reduced.

Easy to Install

Hydro-Brake® Optimum comes with a range of installation options and accessories to make construction and installation as simple as possible.

Setting the Standard

The Hydro-Brake® Optimum is the culmination of more than 40 years of research and development by Hydro International, and the company continues to take an international lead in vortex technology and expertise. Hydro-Brake® Optimum is the only vortex flow control to be independently certified by BBA and WRc for the control of stormwater or combined flows.



Minimal Maintenance

With up to 20% larger outlet clearances compared to other vortex devices, there is significantly less risk of blockage with a Hydro-Brake® Optimum. With no power source or moving parts, it offers minimal, predictable maintenance.

Future-Proofed

Standard, Hydraulically Efficient, Hydro-Brake® Optimum units are supplied with an adjustable inlet, allowing post-installation flow adjustments without the need to replace the whole device.

Flow Control Chamber

A Hydro-Brake® Optimum flow control can be supplied prefitted in a precast reinforced concrete chamber. Custom options including high level emergency bypass, rodding pipe and removable units are also available.

Case Studies



Tight Fit for New Homes

Engineers challenged to solve a “tight fit” surface water management challenge on a West Yorkshire housing development used the Hydro-Brake® Optimum Design Tool to calculate a solution that optimised the limited pipe storage area. Using conventional flow control devices would have required more back up storage than would fit in the space available, but by using Hydro-Brake® Optimum flood protection measures, challenging discharge limits were met for a 1 in 100 year storm.



‘Optimum’ Savings for Developer with 21st Century Drainage

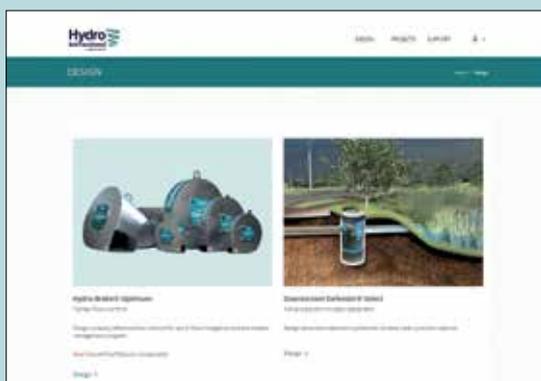
The first phase of Edinburgh City Council's 21st Century Homes project, the Gracemount development showcases sustainable construction. A major feature of the drainage solution is Hydro International's high performance Hydro-Brake Optimum® to control surface water which saved the developers over 30% in storage construction costs.

Photo courtesy of Edinburgh City Council

Hydro-Brake® Optimum Selection Criteria

Suitability:	Most sites, from very low to very high flow rates		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
0.7 – 550 *	0.4 – 4.0	Very good	Low
Moving Parts?	External Power?	Risk of blockage?	
No	No	Very low	

* lower flows may be possible (contact Hydro International to discuss)



Explore the Options with our Online Design Tool

Our online design tool is a sizing engine that gives you the flexibility to compare flow control design options, output detailed design drawings and hydraulic data and import the results into commercially-available hydraulic modelling software.

The tool also has the option to design and customise our latest stormwater treatment separator, the Downstream Defender® Select.

hydro-int.design

Hydro-Brake® Agile

The Hydro-Brake® Agile flow control delivers precision engineering with best value for even the most constrained sites.

The Hydro-Brake® Agile flow control is a float-activated flow control that maintains a constant discharge to deliver precise performance over a wide range of heads. It is ideally suited to applications with constrained discharge requirements or where the flood storage area available through attenuation is very limited.



Surface water
management
and SuDS



Watercourse
flood
prevention



- ✓ No external energy source.
- ✓ Rapid drain-down provides resilience to subsequent rainfall events.
- ✓ Future-proof – simple adjustments possible for future changes in operating conditions.
- ✓ Repeatable, predictable maintenance regime.

Meet Stringent Discharge Consents

Designing flood storage, whether above or below ground, is dependent on the rate at which excess water can be controlled and discharged. The Hydro-Brake® Agile flow control is the only flow control design that achieves a constant rate of discharge and therefore the minimum possible upstream storage.

Whether controlling surface water on a housing development, or regulating flows in a wastewater treatment works, investment in a precision-engineered device can result in considerable savings in total project costs.

Sustainable Solution

The Hydro-Brake® Agile flow control provides sustainable control of flood storage without the need for external power sources or control circuits. Simple adjustments can be made to future-proof the device to allow for climate change.

Quality Manufacture

The Hydro-Brake® Agile flow control is precision-engineered using high-grade stainless steel with long-life, durable components and CE marked in accordance with the EU Machinery Directive (2006/42/EC). Manufactured in the UK, the flow control can be transported quickly to site to meet project timescales.

Easy to Install and Maintain

During dry weather periods, and especially during the first flush of a storm, the outlet area is at its largest, reducing the risk of blockages.

In the event of a blockage, an integrated release mechanism can be operated from surface level, enabling the gate to be fully opened and returned to its operating position.

Hydro-Brake® Agile Flow Control Chamber

The Hydro-Brake® Agile flow control can be supplied pre-fitted in a precast reinforced concrete chamber for quick and easy installation on site.

A range of outlet pipe sizes is also available to suit site requirements. Once lifted into position, the connecting pipework can be connected and a cover slab installed. To suit the location and invert required, the chamber depth can be easily varied with concrete rings.

Example Solutions

Constrained Space

For an urban in-fill housing project in a heavily-developed inner city area, the design team were keen to deliver an effective drainage strategy. However, there was limited space available, conflicting demands from new and existing services, and an existing drainage infrastructure with very limited capacity to accept additional flows.

Using a flow control that provided a near-constant discharge rate within the parameters of the available downstream capacity, the surface water was moved off-site as quickly and effectively as possible, enabling the on-site storage to be reduced to a level that could be accommodated in the heavily constrained space available.

Constant Discharge

Providing temporary flood storage through attenuation was the solution to a known surface water flooding problem. A flow control was needed to limit flow to the existing drainage network, with the excess rainwater overflowing into an off-line attenuation tank. Implementation costs had to be kept to an absolute minimum or the project may not have been feasible. In addition, any surcharge to the upstream drainage network would have moved flooding to a different part of the catchment.

A constant discharge flow control was therefore used to pass forward an appropriate amount of flow at all times, minimising pressure on the upstream network and only putting floodwater into the attenuation structure when absolutely necessary.

Hydro-Brake® Agile Selection Criteria

Suitability:	Constrained sites with stringent discharge consents		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
4.5 – 100	0.4 – 2.4	Good	Very low
Moving Parts?	External Power?	Risk of blockage?	
Yes	No	Not suited to all sites	

Hydro-Brake® Orifice

The Hydro-Brake® Orifice delivers cost-effective, precise, repeatable flow control and is suitable for unconstrained sites with generous discharge consents

The Hydro-Brake® Orifice is a precision-cut orifice plate flow control, available in a broad range of configurations. A low-cost, low-complexity flow control, it is the ideal choice where there is minimal limitation on space available for on-site flood storage and attenuation, or where there are generous discharge consents.



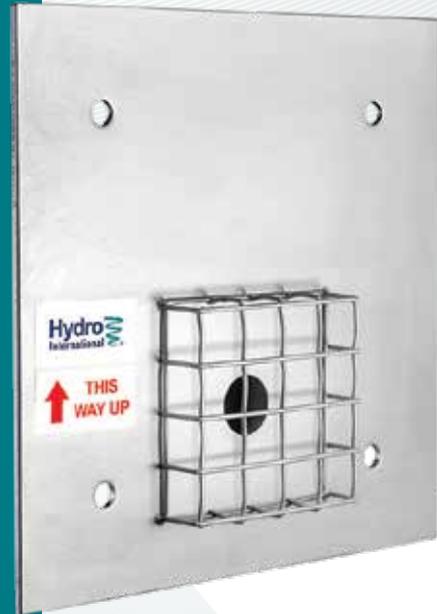
Surface water management and SuDS



Watercourse flood prevention



Sewer network optimisation



Flexible and Versatile

Already trusted as part of Hydro International's family of precision-engineered flow control devices, the Hydro-Brake® Orifice can be designed and manufactured to meet a wide variety of configurations. With the Hydro-Brake® Orifice there is no need to compromise on your project needs.

Configured for Each Site

Each Hydro-Brake® Orifice is manufactured to suit the precise hydraulic requirements specified for the application. Our experienced professional engineering team will work with you to understand the needs of your site and recommend the best solution.

A wide variety of configurations and mounting options is available, for example integrated mesh guards, curve mount, pipe inserts and slide- or pivot-mounts. Hydro International can advise on sizing and flow rates and recommend the best solution for your site.

Quality Manufacture

The Hydro-Brake® Orifice is manufactured from high-grade stainless steel under strict Quality Assurance to the exacting methods and tolerances set out in the international standard BS EN ISO 5167-2: 2003.

Simple to Install

The Hydro-Brake® Orifice is simple to install. It can also be supplied pre-fitted in a precast reinforced concrete chamber for 'plug-and-play' installation on site.

Resilience by Design

The Hydro-Brake® Orifice can be supplied with integrated protection against the risk of blockages. Alternatively, the Hydro-Brake® Orifice can be mounted on moveable or removable structures to allow for manual intervention to drain the control chamber from surface level and clear any blockages that do occur.

Hydro-Brake® Orifice Selection Criteria

Suitability:	Unconstrained sites with generous discharge consents		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
2.5 – 100 *	0.25 – 2.0 *	Not suited to all sites	Unconstrained
Moving Parts?	External Power?	Risk of blockage?	
No	No	Not suited to all sites	

* flows and heads may be possible outside of these ranges (contact Hydro International to discuss)

Hydro-Brake® Flow Control Series Selection Guide

The Hydro-Brake® Flow Control Series is a versatile toolbox for surface water, fluvial, foul water, and sewer network flow control. No matter what the site and budget, every flow control offers the same precision-engineered performance.

Features	Hydro-Brake® Flood	Hydro-Brake® Optimum	Hydro-Brake® Agile	Hydro-Brake® Orifice
Suitability	For watercourses; Flood storage reservoirs	Most sites, from very low to very high flow rates	Constrained sites with stringent discharge consents	Unconstrained sites with generous discharge consents
Flow Range (l/s) *	550 – 12,000	0.7 – 550	4.5 – 100	2.5 – 100
Head Range (m) *	1.5 – 10	0.4 – 4.0	0.4 – 2.4	0.25 – 2.0
Ability to Match Greenfield Discharge Rate	n/a	Very good	Good	Not suited to all sites
Moving Parts	No	No	Yes	No
Future Proof	Option that can be designed in	Adjustable inlet fitted as standard on Hydraulically Efficient units	No	No
External Power Requirement	No	No	No	No
Constant Discharge	No	No	Yes	No
On-site Storage	Low	Low	Very low	Unconstrained
Risk of Blockage	Very low	Very low	Not suited to all sites	Not suited to all sites

* flows and heads outside of these ranges may be possible (contact Hydro International to discuss)

Expert Design Support

No matter how big or small the project, Hydro International's professional engineers are on hand to provide free support to designers and specifiers to aid with the correct selection and configuration of Hydro flow controls for each project design.

Our dedicated design support team advises on best-practice sizing, flow and storage calculations for the Hydro-Brake® Flow Control Series within your surface water, fluvial, sewer or wastewater plant design.

Data, Insight and Analysis Services

Our Hydro-Logic® smart monitoring equipment provides a remote data collection capability that delivers real-world climate, water level, water flow and water quality data in near real time.

Documentation

Our dedicated design support team can assist with the output of hydraulic data to support your system design and dimensioned installation drawings, as well as advising on successful integration with other Hydro International water treatment and storage products.

Call the Hydro-Brake® Hotline 01275 337937
or email stormwater@hydro-int.com.

For Flow Control
Product and Design Advice:

Tel: 01275 337937

Email: stormwater@hydro-int.com

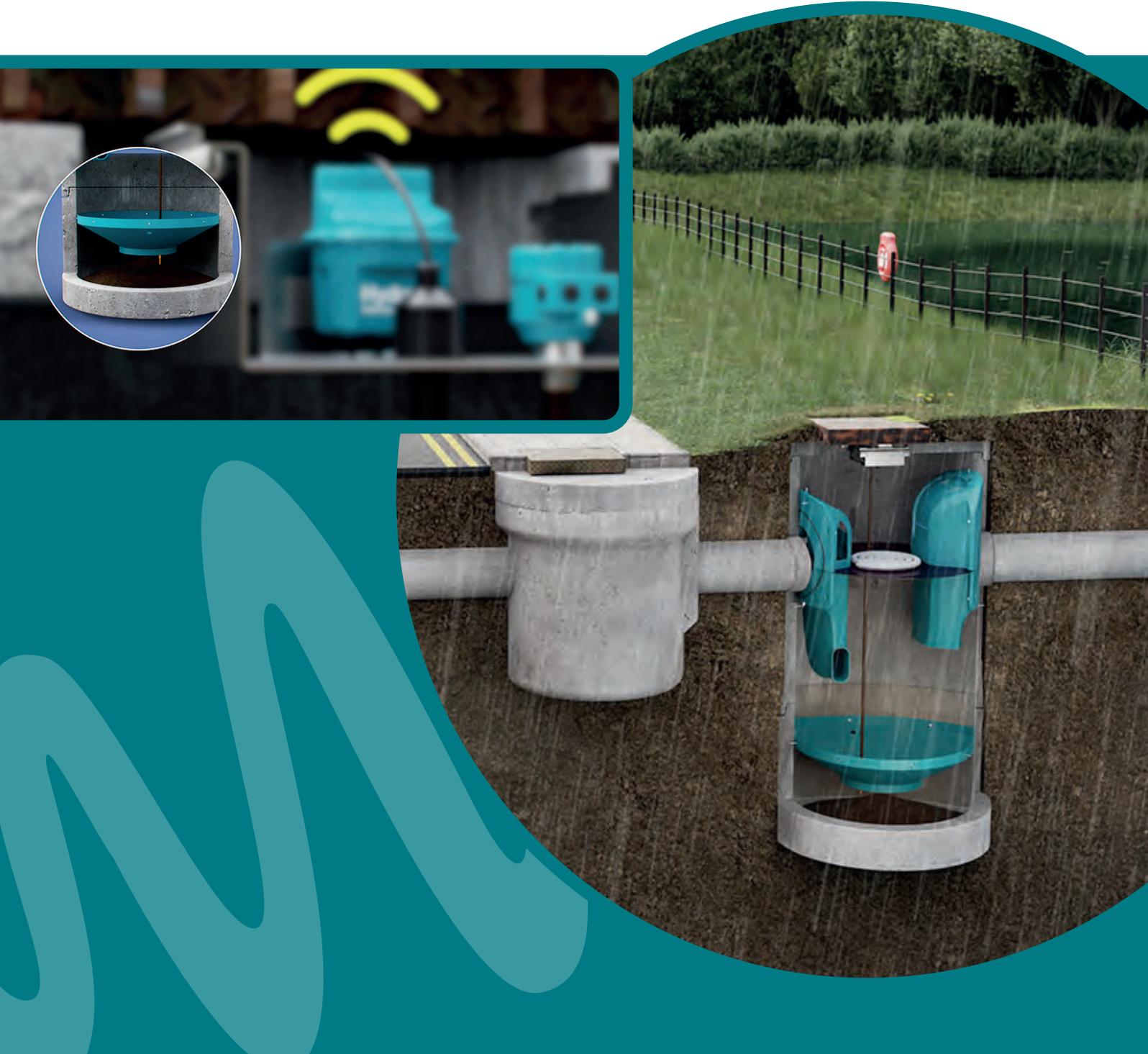
Hydro-Brake[®] Flow Control Series

Unit 2
Rivermead Court
Kenn Business Park
Windmill Road
Kenn
Clevedon
BS21 6FT

Tel: **01275 878371**

hydro-int.com

Turning Water Around...[®]



Continuous remote monitoring and automated alerts give peace of mind and make maintenance easier and more cost-effective.

Hydro-Logic® Smart Maintenance

The Hydro-Logic® Smart Maintenance system is a sophisticated sensor and telemetry package that enables remote, independent auditing of your stormwater device giving complete reassurance that your equipment is being continuously monitored. Alerts will be triggered when abnormal water level activity is detected and/or when sediment build up has reached capacity and maintenance is due.

This system will give complete peace of mind by averting any major incidences before they happen and generating considerable cost savings by only requiring that you remove sediment from your treatment device when required, which also frees up valuable time and resources.



Features

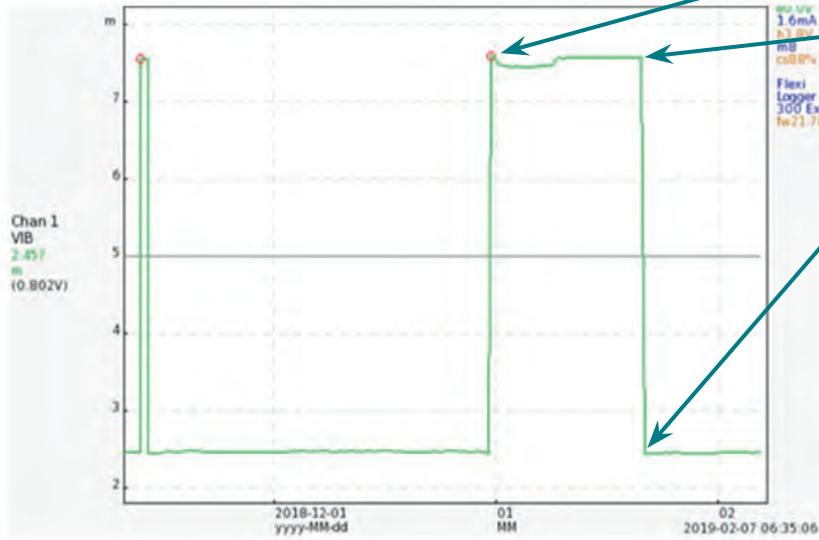
- IP68 rated.
- Equipped with a 4G modem that supports Long-Term Evolution technology (NB-IoT and CAT M1) with 2G fallback.
- FTP and DNP3 protocols supported.
- Local communication via USB cable or Wi-Fi.
- No mains power required - user replaceable 178Wh battery.
- Pre-configured for instant connection to web-browser-based telemetry.
- Easy setup, local or remote, using Harvest software or via browser-based telemetry.
- On-board diagnostics (signal, battery and sensor monitoring).
- Long term secure data retention. Secure data storage in flash memory prevents data loss if the battery fails.
- Simple and quick to install, suitable for temporary or permanent installations.
- 2 Year Warranty.
- Automatic, configurable alerts sent via email and/or SMS.
- No additional IT or telemetry infrastructure required.

Hydro-Logic® Smart Maintenance System

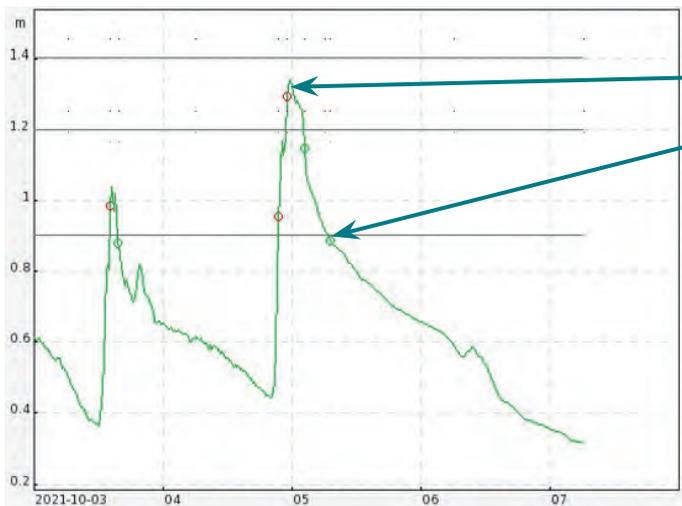
	Water Level	Sediment Level	Sediment & Water Level
Product code	PDA1100.1400	PDA1100.1410	PDA1100.1415
Hydro-Logic® Flexi Logger 105	✓	✓	✓
Water level sensor	✓	X	✓
Sediment level sensor	X	✓	✓
Hydro-Logic® Timeview telemetry access (1 Year)	✓	✓	✓
304 stainless steel mounting frame	✓	✓	✓
Delivery, installation & commissioning	✓	✓	✓

Hydro-Logic® Smart Maintenance

Peak rise in graph shows restriction of vibration which indicates that sediment level has reached capacity.



1. An Alert is sent out to an elected device to trigger a maintenance response for the unit.
2. Unit is emptied.
3. Monitoring levels return to normal.



Water level rises during a storm, then rapidly drops afterwards. Slower drain down times can indicate a potential blockage.



Tel: +44 (0)1275 337937 stormwater@hydro-int.com

Hydro International
Unit 2, Rivermead Court, Kenn Business Park
Windmill Road, Kenn, Clevedon, BS21 6FT

Hydro-Logic® Smart Maintenance B/0524

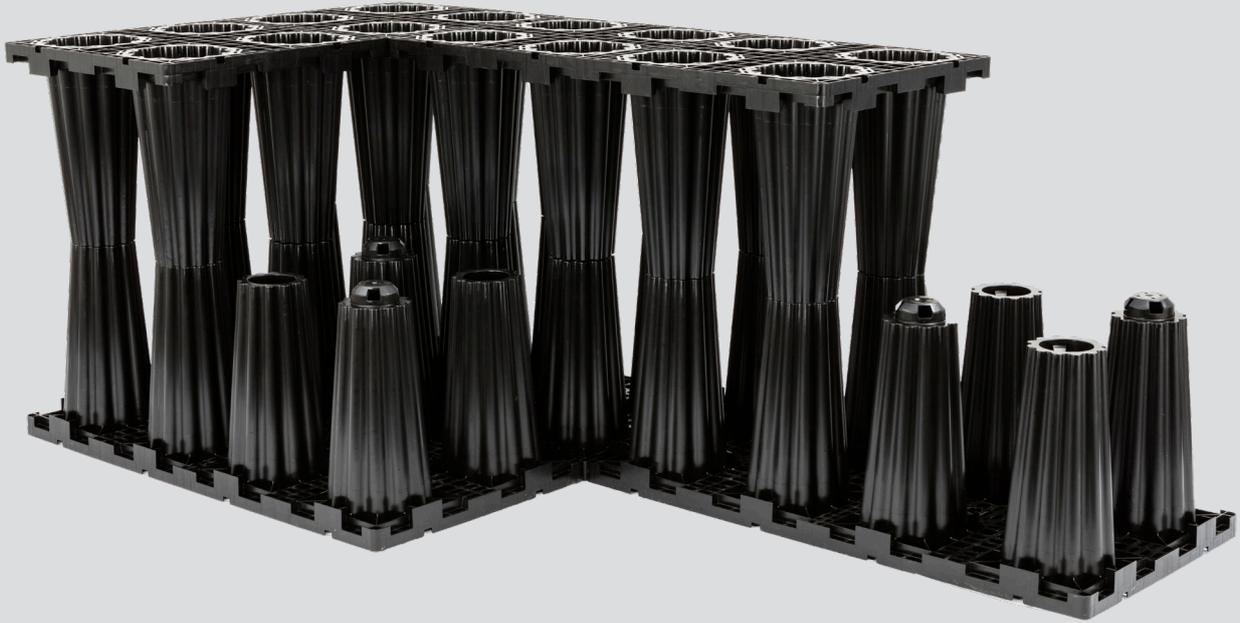
hydro-int.com



ACO StormBrixx SD and HD

MAINTENANCE AND INSPECTION MANUAL

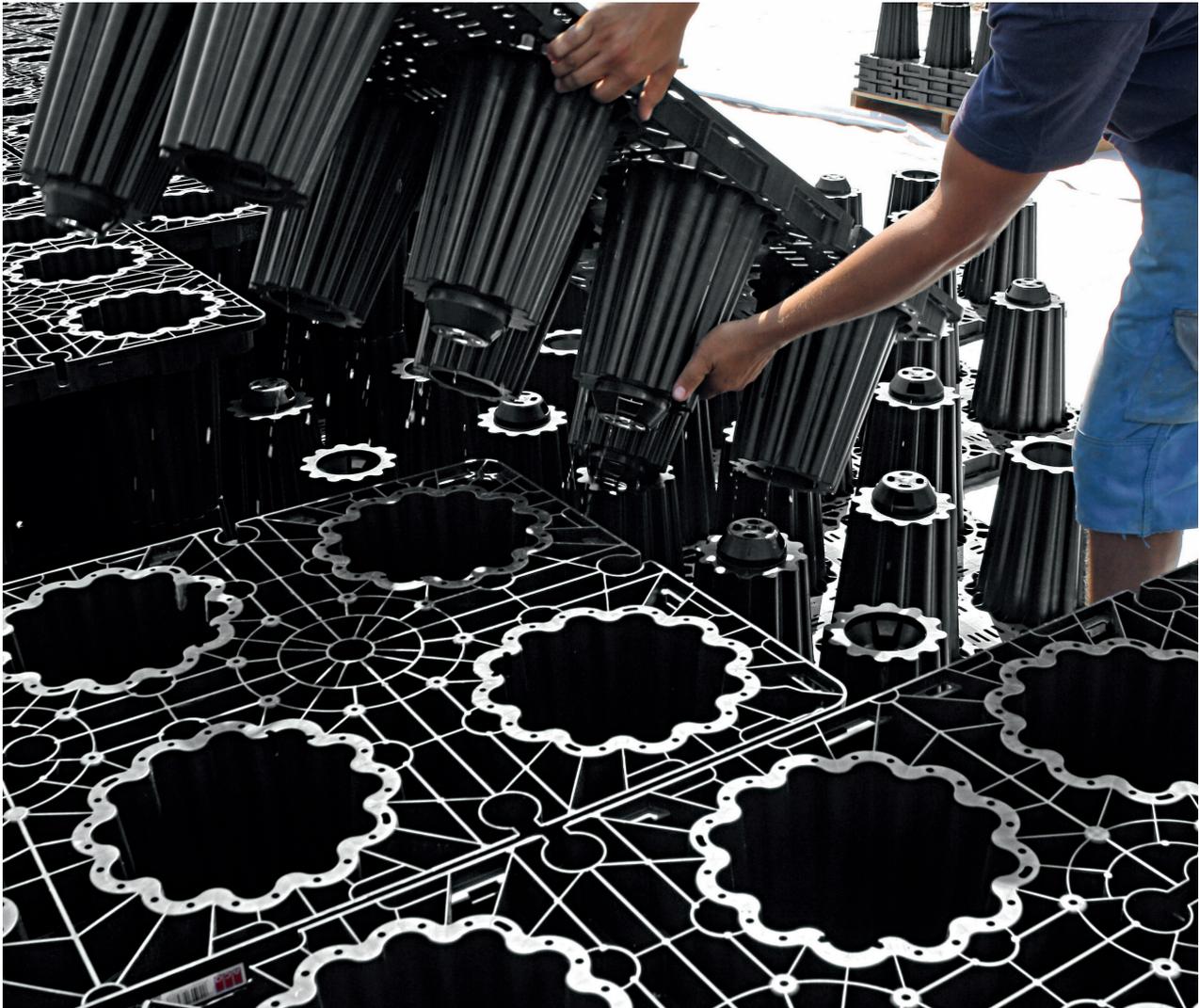






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Information for operators

4

If the owner and the operator are not one and the same, then it is helpful to agree:

- Who is responsible for day-to-day operations?
- Who is responsible for initiating maintenance or repairs for the plant?
- Who will react when there is a malfunction?
- The operator is responsible for the siting (design and dimensions), installation and operation of the system.
- The owner has to ensure that that the operator or person responsible has a copy of the maintenance manual.

It is the responsibility of the operator to ensure the following points are respected:

- The system must only be used as intended and in a good operating condition.
- Maintenance timetables are adhered to and malfunctions dealt with swiftly.
- Only qualified and authorised staff are used.

Visual inspection, maintenance and cleaning of ACO StormBrixx

Thanks to the intelligent building block architecture of ACO StormBrixx, which requires easy-to-erect side panels to be installed to the external perimeter only, the total volume of the installation attenuation/infiltration system can be accessed for inspection and maintenance.

Maintenance work and requirements should be carefully considered during the planning/design phase. Access turrets, sediment tunnels/forebays, and low flow channels can all be incorporated into the StormBrixx system, but the number and combination of these details should be specified as early as possible. In addition to this, we recommend adhering to all the current relevant legal requirements.

During the construction phase, care must be taken to ensure that no sediment enters the inlet pipes, shafts and the infiltration system. At the construction phase an increase in the volume of sediment must be expected from the connected surfaces and must be counteracted.

Maintenance Fequency

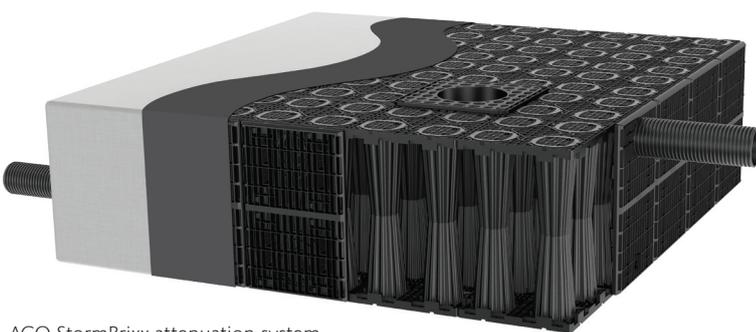
The initial inspection/cleaning of the ACO infiltration system should take place after completion and before handover, so forming part of the commissioning of the installation. A visual inspection of the shafts and a camera passage through the pipes and the storage system is recommended. The results should be recorded in an operating logbook.

To guarantee long-term operability, the recommendations of the current relevant legal requirements must be respected.

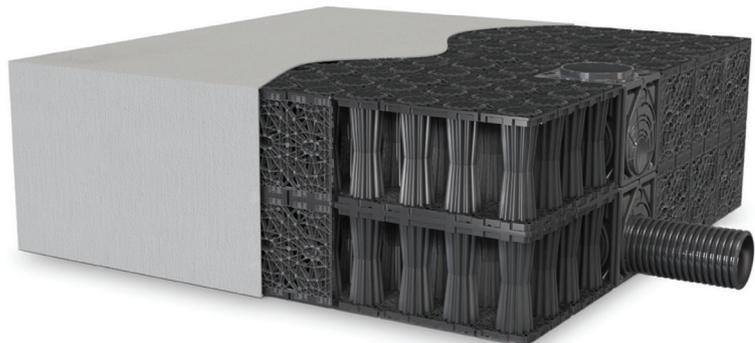
A visual inspection should be carried out at least twice a year, preferably in the spring (high pollen levels) and autumn (falling leaves). If necessary, maintenance/cleaning should be undertaken.

The operator is responsible for ensuring that all maintenance work is carried out by qualified expert staff, who are fully aware of the maintenance and operating instructions. Relevant accident prevention regulations must be respected. The results of the inspections carried out can then be used to determine the frequency of maintenance interventions in future.

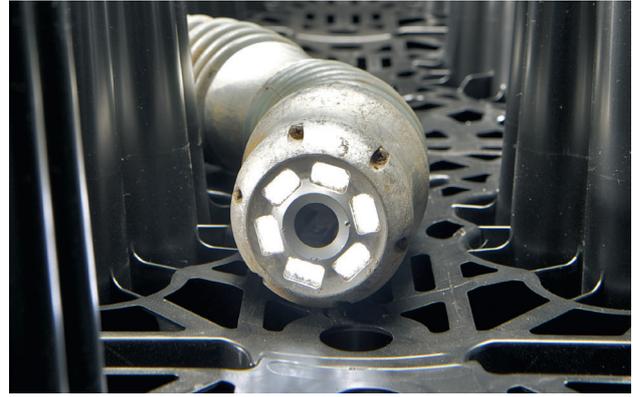
If unusual weather conditions occur (heavy rainfall or similar), additional inspections and/or maintenance are recommended.



ACO StormBrixx attenuation system



ACO StormBrixx infiltration system



Camera and jetting nozzle

The inspection and cleaning access points, consisting of access chambers, intermediate sections and upper parts, provide an easy way for sewer cameras, jetting nozzles and jetting lances to access the ACO StormBrixx hollow block infiltration system.

Cleaning

The cleaning of the ACO StormBrixx infiltration system can, if necessary, be carried out using sewer cleaning equipment (sewer cleaning technology/high-pressure washing). The maximum water pressure must not exceed 100 bar.

The water can be sucked out through the upper, intermediate and lower shaft sections. When disposing of the cleaning water/sediment all applicable legal requirements must be observed.

Visual inspection

Visual inspection includes the following points:

- The condition of the infiltration space (side walls, bases, covers, columns)
- Connecting pipes

If there are signs of leakage, the water-tightness of the system must be re-established by suitable tests. If faults are detected during the visual inspection (dirt, distortions etc.) these must be corrected immediately.

Operating logbook

The results of the visual inspection and any maintenance and repair measures undertaken must be recorded in an operating logbook. These records then allow decisions to be made about the necessary frequency of future visual inspections and maintenance measures.

The following data and information must be recorded in the operating logbook:

- Date of visual inspection or maintenance work
- Identity of staff involved
- Problems arising (also causes of problems)
- Measures taken

Keeping a logbook has many benefits, e.g. traceability of sources of problems, targeted error analysis and determination of follow-up measures.

Warranty

Please refer to the relevant section in the general terms and conditions of sale of the ACO company in your country.

Inspection and maintenance access

Completely installed attenuation/infiltration system with ACO StormBrixx SD:

- Adapter for shaft construction (A) within the overall system
- Upper part (1)



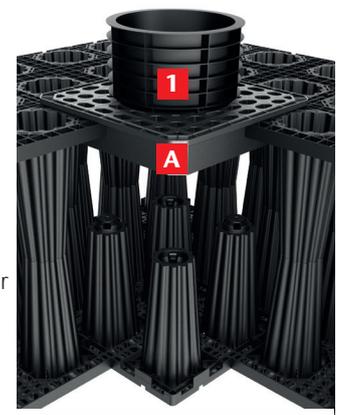
Entrance via access plate

The ACO StormBrixx Adapter for shaft construction (A) is installed as an inspection access **within the block** attenuation/infiltration system. An inspection shaft can thus be installed quickly and economically by simply assembling in the required place. The ACO StormBrixx upper parts (1) are added to the top of the access.



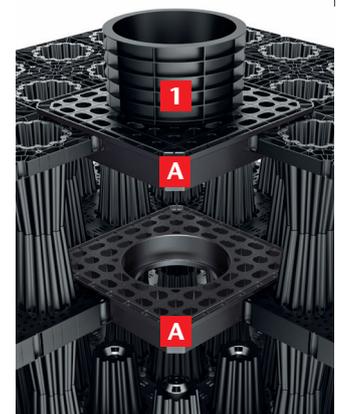
ACO StormBrixx SD:

The adapter for shaft construction (A) together with the ACO StormBrixx riser piece (1) is mounted within the overall system for inspection and cleaning of the system.



ACO StormBrixx HD:

If access points are required within the system, the adapter for shaft construction (A) can be used together with the upper part (1) as an alternative to the access chamber (B) - see page 8.



Completely installed attenuation/infiltration system with ACO StormBrixx HD:

- Shaft base or intermediate part (B) at the edge of the infiltration system
- Upper part (1)



Entrance via access chamber

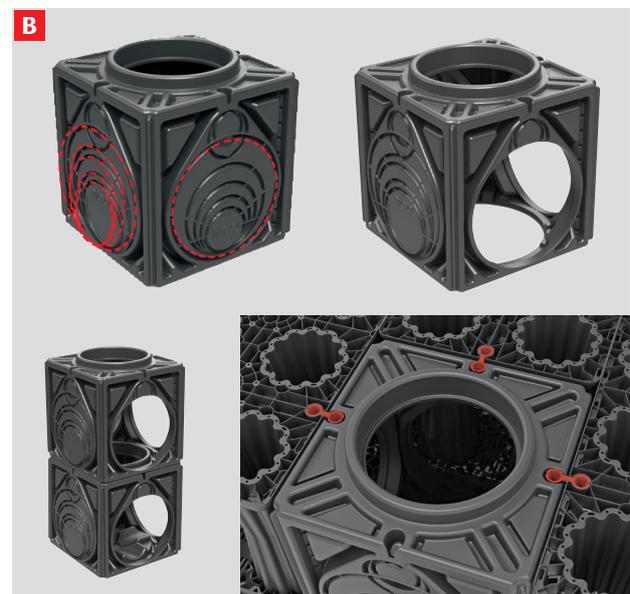
For ACO StormBrixx HD, the access chamber (B) can be located anywhere within the system including the outer edge of the block attenuation/infiltration as a connection and inspection chamber. In multi-layer infiltration systems the access chamber and intermediate parts are simply assembled on top of each other.

Each access chamber can be cut out on site for different pipe size connections according to the in situ requirements. It is advisable to make a predrilled hole for the saw blade. The top of the chamber is added with ACO StormBrixx upper parts (1). The height is variable and is adapted to the ground level. An access cover rounds off the modular system.

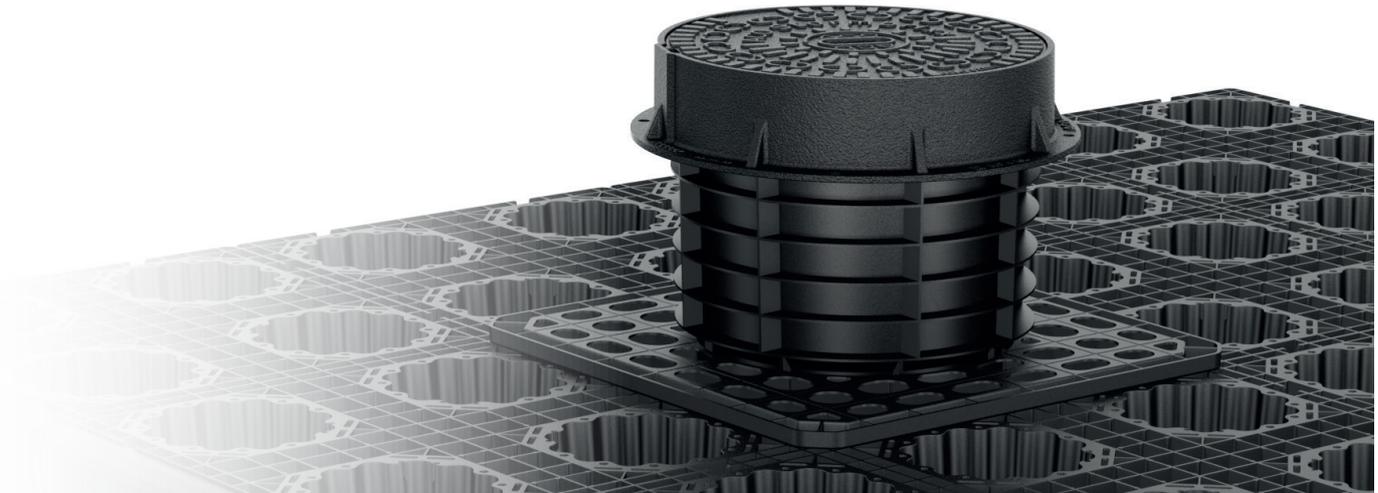
Only in conjunction with StormBrixx HD

The access chamber can be used at the edge of the infiltration system for inspection and cleaning. A lateral pipe connection DN/OD 400 can be made via this.

Access chambers are connected with individual connectors at the edge of the basic element. Do not use connectors on the underside!



Manholes



ACO StormBrixx offers options for accessing the system with a sewer camera or jetting nozzle or lance for inspection or maintenance of the block infiltration system. Shaft upper parts enable access to the StormBrixx system from the surface.

The riser pieces have a push-fit connection which can be adjusted to the longitudinal and transverse gradient on site and can be telescopically adjusted vertically (+/- 30 mm). They are watertight up to 0.5 bar.

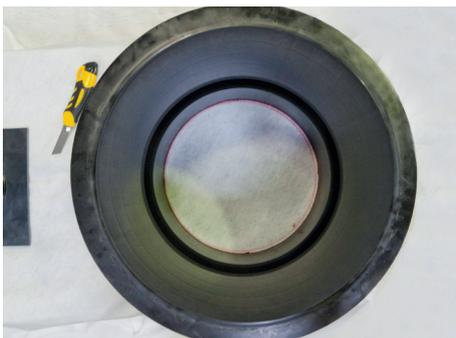
Load separation and vertical alignment of the individual components are ensured by the telescope principle.

Any settlement that occurs in the backfill area can be absorbed by the tolerance window in the telescope. The load of the shaft cover is dissipated by the support of the shaft frame in a fresh concrete bed.

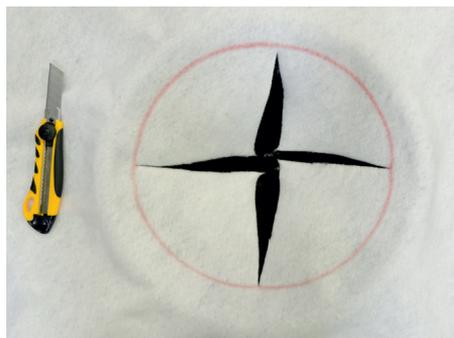
Caution

- Before inserting upper sections, remove protective film from seal and clean it
- Seals must be coated with a suitable lubricant
- Upper section must be inserted to at least the minimum insertion depth

Inset the upper sections



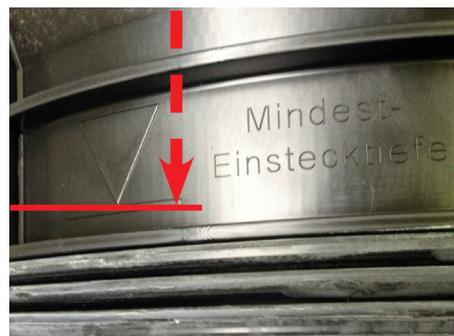
Drawing the inner diameter



Cutting a cross within the marked circle



Installing the intermediate section (= sand tight)

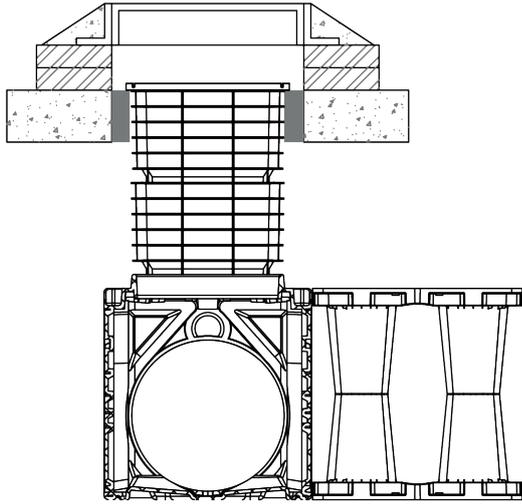


Insert to at least the minimum depth!

Inspection via different access points

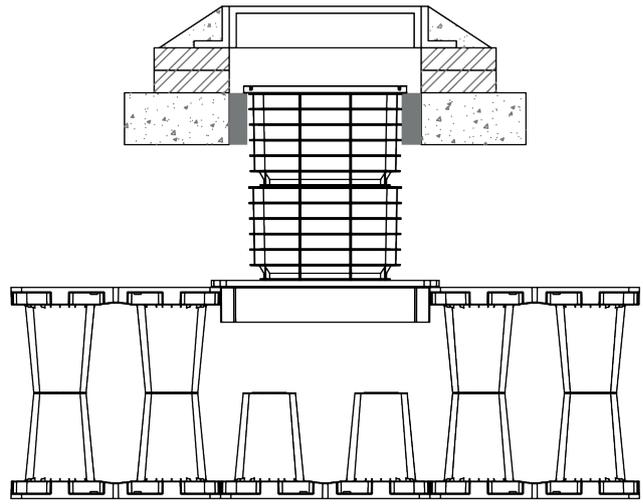
ACO StormBrixx HD

At the edge of the box via the StormBrixx upper part (inner diameter = 339 mm), in connection with the access chamber (inner diameter = 400 mm)



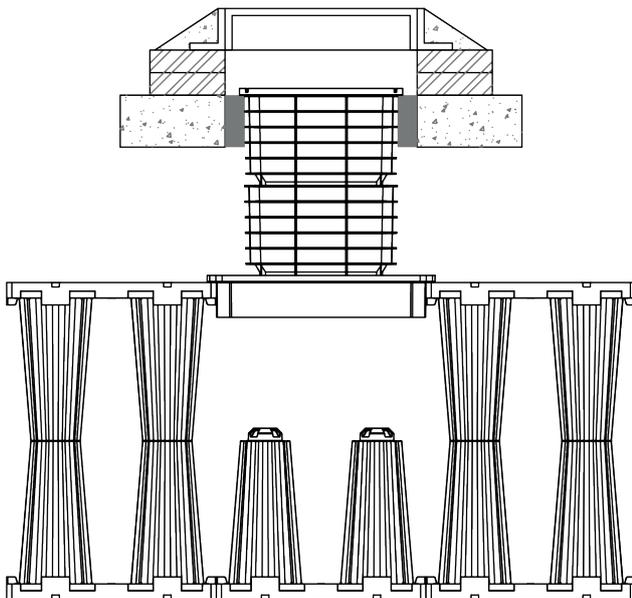
ACO StormBrixx HD

Within the box via the ACO StormBrixx upper part (inner diameter = 339 mm) in connection with the access plate (inner diameter = 400 mm)



ACO StormBrixx SD

Within the box via the ACO StormBrixx upper part (inner diameter = 339 mm) in connection with the access plate (inner diameter = 400 mm)



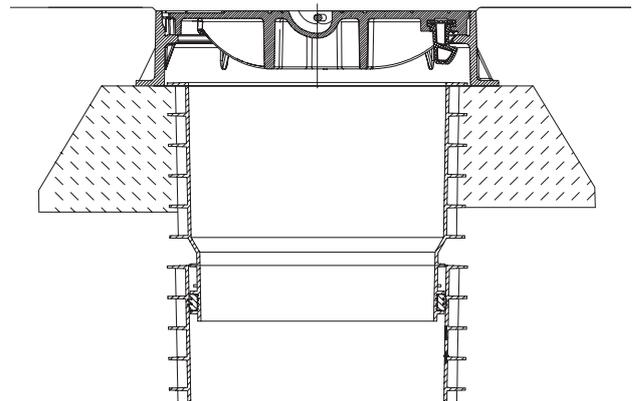
Access Covers D 400



The access cover has a maintenance free, screw-free and traffic-safe catch made from highly wear-resistant plastic (conforms to BS EN 124 / BS EN 1229, is stable at extreme temperatures, repels dirt, is self-locking and vandal-proof).

Once the cover has been put in place, it can be locked into place by stepping on it vertically on the area sitting over the frame. A concrete seating surrounding the upper section provides the load transmission for the shaft cover. A concrete seating C12/15 approx. 20 cm wide is created all the way around, as defined by BS EN 206-1, and raised by 2 cm to the highest drain upper section.

Use the inserted temporary cover/formwork to smooth off the inserted concrete flush. Then remove the temporary cover/formwork, press the frame into the wet cement base to a depth of approx. 2 cm until it is completely seated on the upper shaft section or as required for the final height.



Depth of concrete: 20 cm

Concrete quality: \geq C12/15



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