

Hydro-Brake® Flood

The vortex controlled solution to fluvial flooding



The challenge of climate change and fluvial flooding

Protecting homes and businesses vulnerable to fluvial flooding from the devastation and financial loss it can cause is a high priority for Government agencies, flood authorities and local communities in the UK.

Flooding is now regularly making headlines in the news due to the more frequent and extreme storm events as a result of climate change and increased urban development. The new National Flood Risk Assessment (NaFRA) published by the Environment Agency in January this year shows that around **6.3 million homes** and businesses in England are at risk of flooding from either rivers, the sea or surface water. The NaFRA predicts that by 2050 the total number of properties in England at risk from flooding from rivers or the sea will **increase by 27%** between 2036 and 2069, around 3.1 million. Infrastructure is also at risk, with around a third of all roads, railways, water pumping stations and treatment plants located in areas at risk from one or more sources of flooding¹.

Flooding and managing flooding costs the UK around £2.2 billion each year, with around £800 million a year spent on flood and coastal defences. The average annual cost of damage caused by river and coastal flooding is estimated to be **£1,040 million in England and Wales and £32 million in Scotland**².

- 1 Source: Environment Agency's National assessment of flood and coastal erosion risk in England 2024. Updated 22 January 2025 - <https://www.gov.uk/government/publications/national-assessment-of-flood-and-coastal-erosion-risk-in-england-2024/national-assessment-of-flood-and-coastal-erosion-risk-in-england-2024>
- 2 Source: Government Foresight Project - Future of flood and coastal defence: <https://www.gov.uk/government/collections/flood-and-coastal-defence>



The vortex technology solution

Hydro International's Hydro-Brake® Flood vortex flow controls are already delivering sustainable, low-maintenance, no-power solutions that help provide protection to more than **7,000 properties**. They range from dispersed storage and control schemes with pass forward flow rates of just a few litres per second to major dams **controlling flows in excess of 10 m³/s** and holding back millions of cu.m of flood water.

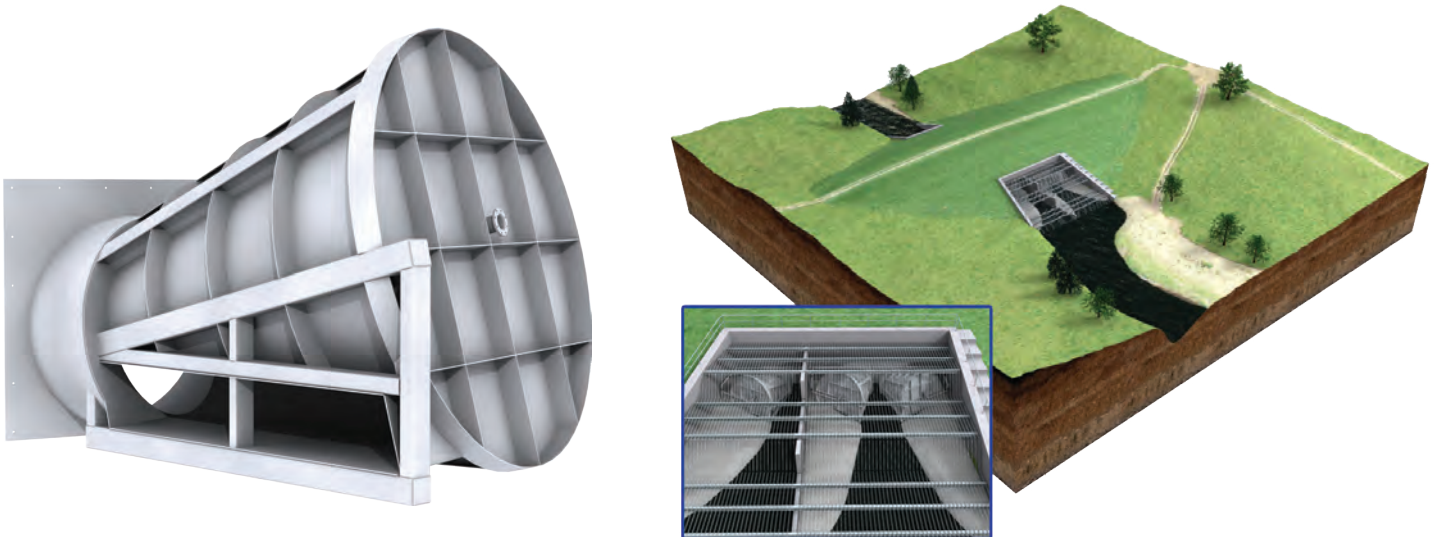
Hydro-Brake® Flood vortex flow control

The Hydro-Brake® Flood vortex flow control provides large-scale protection at watercourse level, using **precisely engineered vortex flow control technology** to manage flood water, preventing costly damage and disruption to downstream residents, businesses and infrastructure.

With **no moving parts** and **no power requirements** Hydro-Brake® Flood Alleviation is ideal for controlling very large river and watercourse flows.

The bespoke design and performance characteristic of the Hydro-Brake® Flood Alleviation flow control can reduce the volume of flood water to be stored by up to 30% compared to fixed orifice controls; reducing land take during storm events.

Hydro-Brake® Flood Alleviation flow controls have a **proven track record** dating back to a first pioneering application in the early 1990's.



Hydro International are experts with over **40 years' experience** of **development and design** of vortex flow controls to deliver the best solutions across a wide range of applications.

Benefits

Design site-specific flood protection

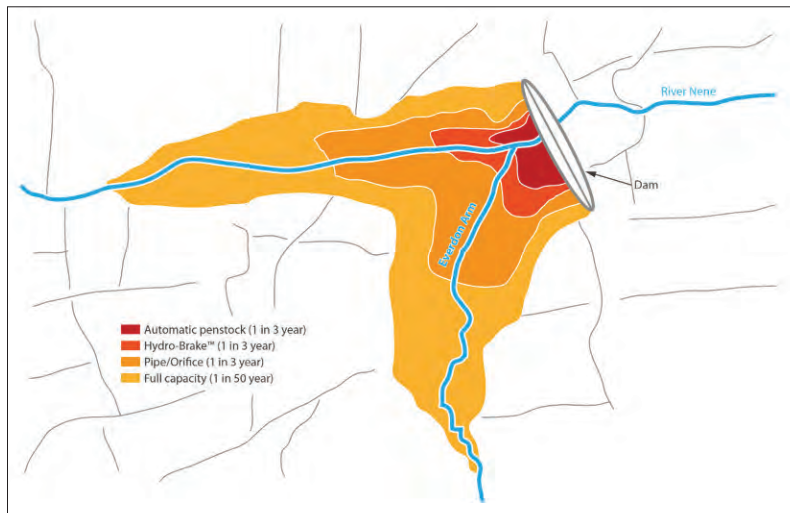
Each Hydro-Brake® Flood flow control is designed according to the specific requirements of the site, ensuring that each system is precision engineered to deliver exactly the right level of flood protection. Our experts have decades of experience in designing flow control solutions, and will be happy to work with you to understand your requirements and to develop a flow control to provide precisely the level of protection that you need.

Reduce land take and associated costs during storm events

By releasing more flow at the beginning of a storm event Hydro-Brake® Flood can provide flood protection with up to a 30% storage reduction compared to fixed orifice type devices.

Drain down time is also significantly reduced, helping to reset the system should there be a subsequent event.

Diagram showing savings in storage achieved on a scheme in Northants.



Reduce maintenance and operating costs

Hydro-Brake® Flood is a passive, self-activating device which has no moving parts and requires no power to operate, resulting in lower operating and maintenance costs. With no requirement for power, it is ideal for installation in more rural areas where a power supply may not be available. Due to its large open area it provides reduced flow velocities and can also reduce scour and erosion to the outlet structure by dissipating the energy in the flow as it's released downstream.

Build-in future-proof variability

The Hydro-Brake® Flood can be supplied with a built-in option to adjust flows should there be variances in hydraulic modelling or for adapting to a changing climate.

Rely on structural strength

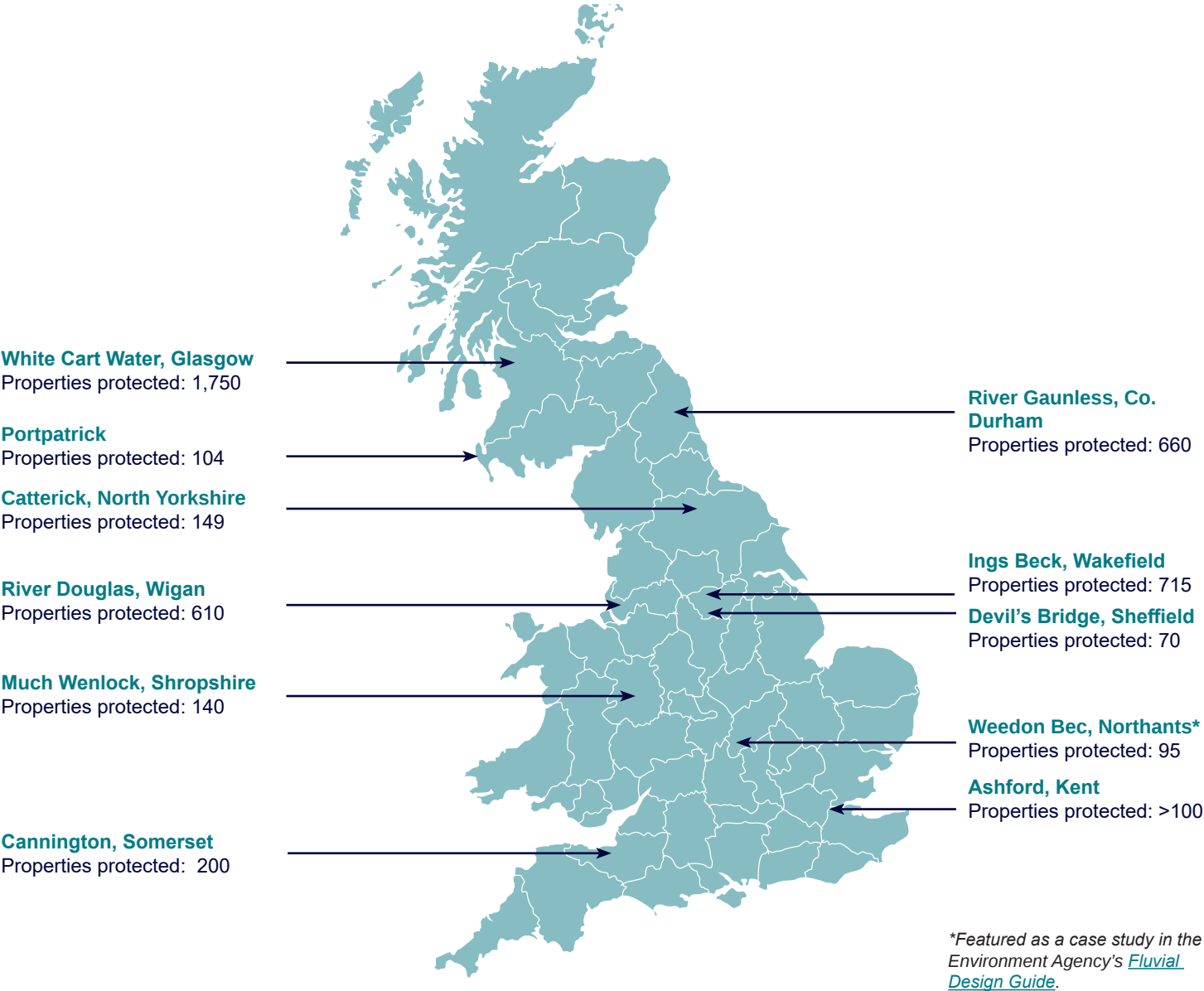
All Hydro-Brake® Flood units undergo structural calculations and are built to withstand the extreme forces generated by high flows.

Improve water quality

The Hydro-Brake® Flood aerates the flow as it operates, increasing oxygen levels in the water and helping improve the health of the river.

Track Record

Proven track record in the UK. Example schemes include:



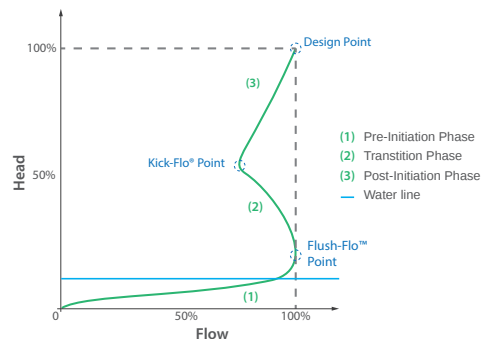
**Featured as a case study in the Environment Agency's [Fluvial Design Guide](#).*

How it works

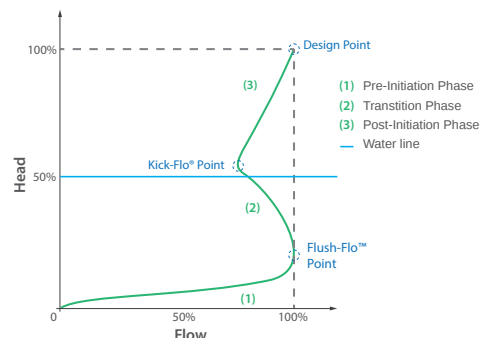
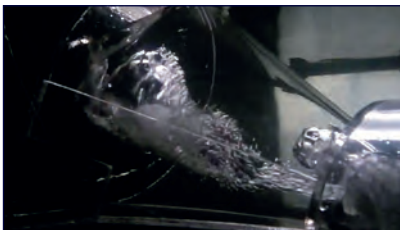
The hydraulic behaviour of the Hydro-Brake® Flood is described by its hydraulic characteristic curve, which relates the discharge flow from the unit to the hydraulic head acting upon that unit.

The hydraulic characteristic curve consists of three distinct sections, each corresponding to a different governing flow control regime:

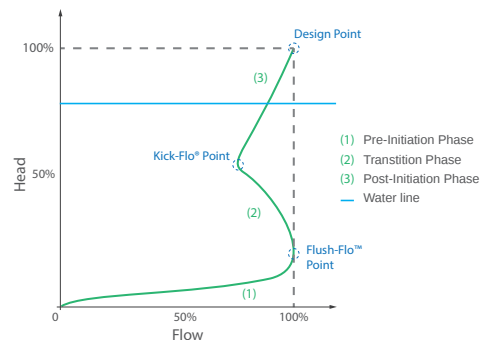
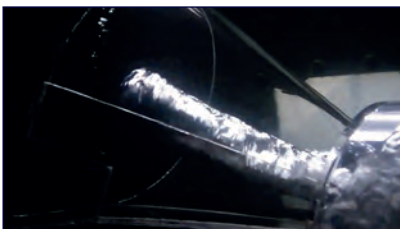
1. The pre-initiation phase – governed by orifice flow and defined on the characteristic curve as the region between the origin and the point at which the vortex begins to have a throttling effect (Flush-Flo™ point). In this region, the depth of water is below the soffit of the outlet orifice of the Hydro-Brake® Optimum.



2. The transition phase – governed by vortex formation and defined on the characteristic curve as the region between the Flush-Flo™ and the point at which the vortex has fully initiated (Kick-Flo® point). In this region the vortex will continually form and collapse. A trapped volume of air inside the Hydro-Brake® Optimum will exert a back pressure and cause the discharge rate to reduce even though the hydraulic head continues to increase.



3. The post-initiation phase – governed by stable vortex flow and defined on the characteristic curve as the region above the Kick-Flo® point. A stable vortex is formed and sustained. An air filled core at the centre of the vortex acts as a pseudo-physical flow restriction by reducing the cross sectional area available for the passage of water.



Case study Wigan town centre



Two 2 m diameter Hydro-Brake® Flood Flow Controls were installed within an 8 m high dam.

The dam creates a potential 370,000 m³ of flood storage extending along a kilometre of the Douglas Valley.

Protecting 610 properties



Case study

White Cart Water



The largest Hydro-Brake® Flood vortex flow controls were installed in three dams to create three flood storage areas to help prevent flooding in Glasgow.

The three flood storage areas have capability to hold back 2.6 million cubic metres of flood water and reduce peak river flows by up to 45%.

Protecting 1750 properties



Case study Cannington



Three 1 m diameter Hydro-Brake® Flood Flow Controls were installed in a dam to restrict the flow of water to a maximum flow of 5,000 l/s.

Protecting 200 properties and the A39





Three Hydro-Brake® Flood vortex flow controls were installed at the outlets to two ponds, providing a water storage capacity of 21,104 m³.

Hydro-Logic® Smart Monitoring was also installed at each site to provide accurate and reliable real-time information and data.

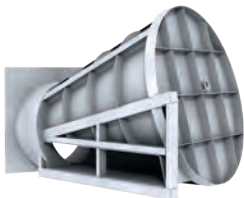
Protecting 140 properties

Case study Much Wenlock

Our full range of Hydro-Brake® Flow Controls

As a brand leader for vortex flow controls for more than 40 years, Hydro International continues to set the standard in flow control management technologies. The Hydro-Brake® Flow Control Series is a comprehensive and versatile toolbox of precision-engineered devices for flow attenuation and control that can help deliver compliant schemes with scaleable, precision flow control performance.

Every device in the series is tested and manufactured to exacting standards and wherever possible, independently accredited to provide the reassurance of reliable, repeatable through-life operation.

Features	<u>Hydro-Brake® Flood</u>	<u>Hydro-Brake® Optimum</u>	<u>Hydro-Brake® Agile</u>	<u>Hydro-Brake® Orifice</u>
				
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)

Patent: www.hydro-int.com/patents



Contact us:

For help with sizing and design
please call **01275 337937**
or visit [**hydro-int.com/hydrobrakeflood**](https://hydro-int.com/hydrobrakeflood)

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