

## Hydro-Brake® Flood provides protection to Northampton, UK

### Project profile

#### Objective

To prevent flooding to villages in the upper River Nene valley, near Northampton, UK, minimizing footprint, visual impact and maintenance requirements.

#### Solution

The UK Environment Agency specified a dam to contain floodwater in the catchment area. The key component of the project is the 7.2 ton, 7 ft diameter Hydro-Brake® Flood flow control.

### Product profile

- Reduces stormwater storage requirements by up to 30%
- Up to 50% savings in project costs
- Self-activating and self-cleaning, with no moving parts or power requirements
- Area of opening is 3-6 times larger than the equivalent orifice
- Virtually maintenance free

In 1998 the scenic Northampton villages around Weedon in the upper River Nene valley suffered disastrous flooding due to an exceptionally wet season, with more than three times the average rainfall. A total of 45 business and residential properties were flooded, with another 95 properties at risk. Flooding had become an increasingly prevalent issue in the area, with a chance of a major flood every three years.

To alleviate the problem and prevent future flooding, the Environment Agency (EA) and their engineering consultants evaluated two options: enlarging the conveyance channels running through the centre of the village, and providing stormwater storage upstream.

Because of space constraints around the existing channel and the increased likelihood of downstream flooding if the channel were widened, the team chose to create an emergency flood storage reservoir at a sparsely populated agricultural site upstream.

The reservoir would be created by building a dam with an outlet flow control to prevent excess stormwater flows from surging downstream and flooding the villages. The objective of the reservoir design project was to minimise the footprint, visual impact and necessary maintenance.

Minimising any possible adverse environmental impacts was a crucial part of the plan, and the EA made an arrangement with the local farmers to allow their fields to flood behind the dam during heavy rainfall to avoid damage downstream.



The outlet flow control device on the dam was a key component in the overall design.

The design team considered a fixed orifice outlet, but the orifice would require a larger footprint because it impounds water within the reservoir even during small storm events.

The team also considered a slide gate, but a manual slide gate would have required a high maintenance commitment and an automatic slide gate would have been prohibitively expensive.

Finally, the team considered a Hydro-Brake® Flood flow control. With a variable head-discharge curve, the Hydro-Brake® Flood prevented the impounding of water (and flooding of farmland) during small storms, yet throttled flood-level storm flows down to an acceptable flow rate of 273 Mgal/d (423 cfs) during intense storm events.

The final dam design consisted of a 1,476 ft long clay embankment that stands 22 ft high.

The culvert on the line of the original river channel conveys the discharge through the reservoir and out through the dam.

A 7.2 tonne, 7 ft diameter Hydro-Brake® Flood flow control is situated over the outlet.

The area around the dam is landscaped to minimize the visual impact of the structure.

The use of the Hydro-Brake® Flood at the inlet to the culvert provides a controlled maximum design flow of up to 273 Mgal/d (423 cfs) of water despite a fluctuating head, and an adjustable intake allows for variation in flow down to 182 Mgal/d (282 cfs).

The hydraulic characteristics of the flow control allow for a dramatic 66% reduction in land take required for the 1 in 3 year storm, compared to that which would have been required for an equivalent orifice.

Because the Hydro-Brake® Flood flow control achieves maximum design discharge rates at lower heads than conventional flow controls, the effect of reservoir ponding on agricultural land is minimized.

The cost of the system was also significantly less because unlike an automatic gate valve, the Hydro-Brake® Flood system is self-activating with no moving parts and no power requirements.



*The Hydro-Brake® Flood flow control during construction*



*Construction of the trash screen*



*The flood storage area in use following storm conditions*

## Learn more

To learn more about how Hydro-Brake® Flood can help you to manage water more effectively, visit [hydro-int.com](https://hydro-int.com), search **Hydro-Brake Flood** online or contact us:

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