

### Biwater

Biwater Treatment Ltd achieves a positive result to a negative transient pressure challenge.

Biwater Treatment Ltd, part of the Biwater Group plc, offer consultancy services to the water industry around the world. Simon Johnson, Senior Operations Engineer explains how they used Flowmaster to provide cost effective solutions to their customers.

#### The Challenge

Biwater Treatment designed and installed a pressurised filter and membrane plant at Broadford water treatment works (WTW).

In brief the plant consists of a filtration unit positioned downstream of a pumping station which in turn is supplied, via a gravity fed suction main, with water from the Allt a Mhuilinn river, 1.2 km away.

During commissioning of the plant the site engineers observed that the primary filters frequently blocked which triggered a backwash cycle. On site investigations revealed that, following the onset of the backwash cycle, which caused a sudden increase in flowrate through the intake pumps, air was entering the system, collecting on the filter screen and causing further blockage.

*“We have used Flowmaster for over 5 years on a range of projects and so we are confident in the accuracy of the results.”*

*Simon Johnson,  
Senior Operations  
Engineer, Biwater*





## The Solution

Since the onsite investigations lead to the assumption that air was entering the system and the most likely route was through air valves situated at intervals along the suction main, the next stage was to prove this and then propose a cost-effective solution.

Once it could be numerically proven that the negative pressure transients caused the air valve on the suction main to open, the task was then to propose a solution. The simplest and most cost effective way came in the form of a bladder type surge vessel to absorb the rate of change of flow. Furthermore air release valves were fitted to the filter vessels.

## The Results

From the initial simulation that proved the pressure in the suction main was causing the air valves to open and identify which backwash flow rates were the cause, the model was then modified to include the bladder type surge vessel and predict the optimum size and connection diameters to the existing system. Figures 1 and 2 show the pressure transients at the most critical point before and after the surge vessel is added. The addition of the surge vessel and air release valve on the filters at Broadford has reduced the frequency of the backwash cycle from typically 5 minutes to over 60 minutes and the ensured that clean safe water can be produced

as economically as possible. The use of Flowmaster reduced the time to quantitatively identify the cause of reported problems and investigate cost effective solutions, faster and more accurately than traditional testing.

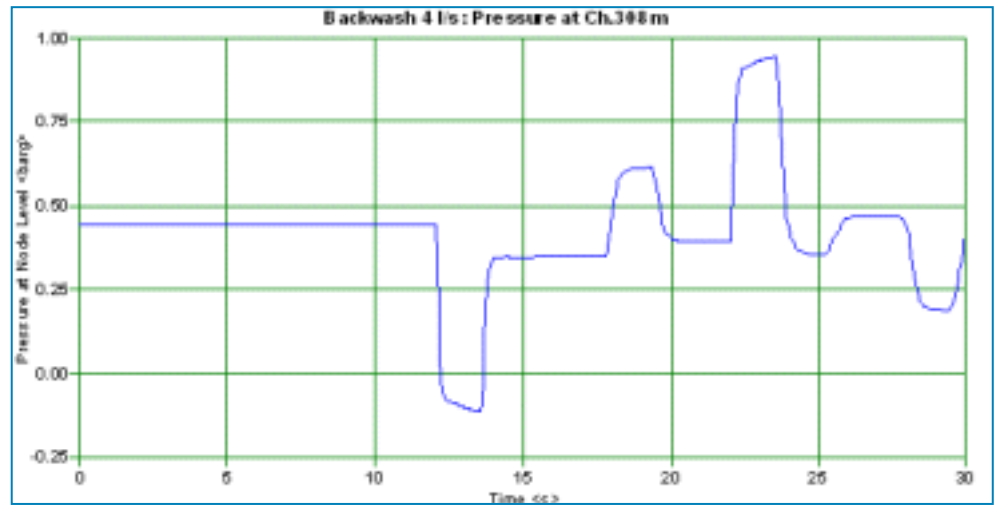


Figure 1: The negative pressure transient at chainage 308m.

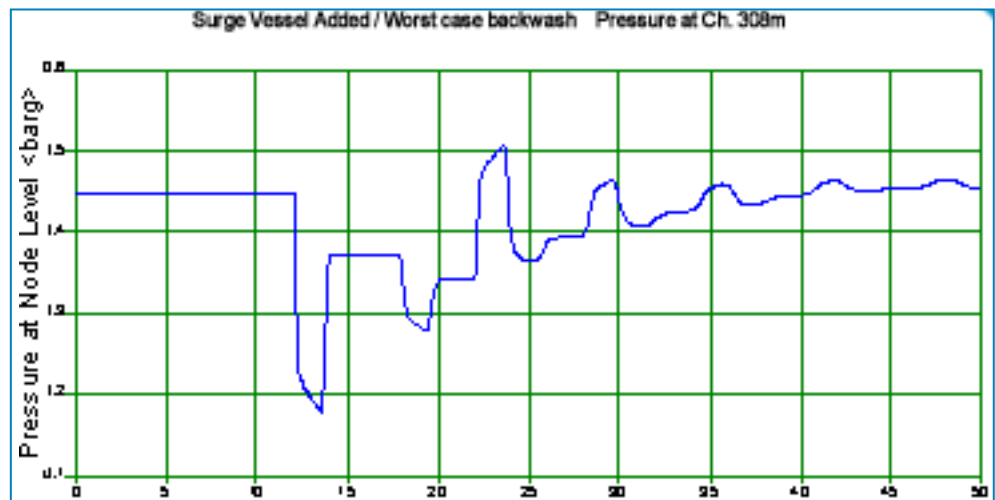


Figure 2: The elimination of negative pressure at a higher backwash flow rate (worst case) for the same point due to the addition of the surge vessel.

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