

# Flood Modeller Pro

Case Study

## One-dimensional modelling of the Somerset levels and moors, England

The Somerset Levels and Moors are a managed catchment with the flow of water being controlled by a network of structures and pumping stations. During winter 2013-2014, the catchment experienced widespread flooding which was modelled using the Flood Modeller 1D solver.

The flood event began in mid-December 2013 and continued for two months. During this time, there was only one day in which the catchment did not experience any rainfall. This led to over 500,000,000 m<sup>3</sup> of water entering the lowland area of one of the key catchments (River Parrett catchment).

The Environment Agency for England estimated that there were in excess of 65,000,000m<sup>3</sup> of floodwater on the land, covering an area of 65 km<sup>2</sup>. The Environment Agency carried out the single largest pumping operation ever experienced in the United Kingdom. In addition to the permanent pumping stations temporary pumping units (as shown below) were introduced at many locations.

Black & Veatch were appointed by the Environment Agency to provide expert input and advice during the flood event. This included advice on the hydraulic implications of varying intervention options.

During the flood event the 1D hydraulic model was used to perform 'what if' scenarios. These scenarios supported the response to questions raised by the incident team, residents, media and government, meeting the need for science based answers.

Results of these scenario tests were often required with minimal warning in a very short timeframe. Therefore the ability to run multiple variations of the model using the Flood Modeller 1D solver, without compromising the accuracy of the results, was essential throughout the course of this event.

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Transfer of flow between river systems over Allermoor spillway

### Contact us

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**JACOBS**

With a legacy stretching back 40 years, Flood Modeller allows users to model rivers, floodplains and urban areas, using our powerful 1D and 2D solvers.

“The most suitable tool for modelling this catchment due to the nature of flood flow within it and in particular the need to quickly simulate a long duration flood event without any loss of accuracy.”

Andy Wallis, Technical Director  
(Black & Veatch)

Flood Modeller Pro can be used for a range of applications, including:

- 1D and 2D floodplain modelling
- Floodplain mapping
- Flood forecasting
- Hydrological analysis
- Embankment/levee failure
- Dam breach analysis
- Options appraisal
- Detailed design
- Structure blockage



Temporary pumping units were introduced at many locations

The hydraulic model used for these assessments was reviewed by an international expert review panel during the flood event. The model has been and will continue to be used to support the assessment of interventions contained within the 20 Year Flood Action Plan.

Andy Wallis, Technical Director at Black & Veatch commented that our 1D solver "was the most suitable tool for modelling this catchment due to the nature of the flood flow within it and in particular the need to quickly simulate a long duration flood event without any loss of accuracy. The productivity tools within the software also assisted in the model build process."

Following the flood event, the model has been further enhanced with new data including channel surveys, bank surveys and revised hydrology. The final model contains 4,668 nodes, representing over 135 km of channel and the associated moors.

There are 40 separate pumps represented in the model, each with up to 32 operational rules. There are 270 km of banks represented in the model by spill units. These are critical to the overall performance of the system and significant time has been spent, and data used, to ensure suitable discharge coefficients were selected.

Overall the final full model can simulate a 3 month flood event in 16 hours of computer time, whilst still providing the required level of accuracy.

This case study was showcased by Black & Veatch as a presentation for the Flood Modeller Suite User Conference 2014. It was developed by Claire Wasiak, Hydraulic Modeller, and presented by Andy Wallis, Technical Director, at the event.

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