A new output from the Defra and Environment Agency Joint Science Programme on Flood and Coastal Erosion Risk Management provides software tools to enable flood risk management and drainage practitioners, Development Control staff and researchers to estimate afflux, which is defined as the increase in water levels upstream of a structure or other obstruction in a watercourse.

The risk of flooding is strongly determined by water levels in rivers, drains and other watercourses that carry high flows. This research aims to improve our understanding of how in-channel waterway structures affect flood water levels at high flows. In particular, this project provides software tools for estimating afflux. It complements work carried out in a related Defra/Environment Agency project, which has developed the Conveyance Estimation System (CES), a software tool for estimating conveyance in a river reach.

The project researched a range of methods for calculating afflux, to determine how well they could be applied to the various types of bridges and culverts found in UK channels. This involved obtaining laboratory and field datasets from previous work then using these to determine the most suitable formulae for calculating afflux. These were incorporated into a series of software tools.

The Afflux Advisor is a spreadsheet tool which is ideal for occasional use by non-specialists, providing an indicative value and uncertainty for afflux at a single structure and under certain flow conditions. Users can enter bridge or culvert details, such as shape, skew, eccentricity and entrance rounding, as well as a cross-section of the channel at the structure. Picture libraries are used to help select pier, inlet / outlet and abutment shapes.

The Afflux Advisor is provided for people who need a rapid estimate of the effect of any existing or proposed bridge, such as Development Control staff, but who do not have the need for levels elsewhere along the river, drain or watercourse.

The Afflux Estimation System (AES) is a more rigorous tool for calculating afflux, based on a combination of hydraulic theory with field and laboratory data. It is suitable for design or flow modelling applications, and is intended for use by more experienced practitioners. It has a range of methods for calculating how a structure will affect water levels at a range of flows, by comparing the water levels in the channel upstream of a structure in a reach 'with' and 'without' the structure.

The program code for the AES is compatible with that for the companion CES and the two packages are delivered and supported alongside each other. They are available within the ISIS Flow 1-D channel modelling package and will also be made available under licence in open code software with appropriate documentation to researchers or to other developers of commercial executable software.

The combined CES/AES software is also available as a stand-alone package for engineers to estimate water levels along an open channel reach containing crossings.

To support the software, User Guides and a Hydraulic Reference document have been produced for both the Afflux Advisor and the Afflux Estimation System. The Hydraulic Reference document contains the detailed research record of the project, including the comparison of outputs from the Afflux Estimation System with field measurements and other software.

The software and accompanying documentation can be downloaded from www.river-conveyance.net. The site also provides full background to the project and the software development, information about user-training and a set of Frequently Asked Questions.

The AES software will be subject to periodic review and updating in the light of user-experience, developing user needs and advances in the underlying science.
This summary relates to information from Science Project SC030218, reported in detail in the following outputs:-

Please note that these documents support the software developed as the primary output of the R&D project, and are subject to future updating.

**Science Report**: SC030218/SR  
**Title**: Afflux Estimation System: Hydraulic Reference  
**June 2007**  
**Web address**: [www.river-conveyance.net/aes](http://www.river-conveyance.net/aes)

**Science Report**: SC030218/PR  
**Title**: Afflux Estimation System: User Guide  
**June 2007**  
**Web address**: [www.river-conveyance.net/aes](http://www.river-conveyance.net/aes)

**Science Report**: SC030218/PR  
**Title**: Afflux Advisor: User Guide and Technical Reference  
**June 2007**  
**Web address**: [www.river-conveyance.net/aes](http://www.river-conveyance.net/aes)

**Internal Status**: Released to all regions  
**External Status**: Publicly available

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