



# Maintaining the scientific relevance of the Conveyance and Afflux Estimation System

## Project Summary SC070032/S1

The Conveyance and Afflux Estimation System (CES-AES) is a software tool for improved estimation of flood and drainage water levels in channels. The original development took place under the Defra/Environment Agency projects W5A-057 and W5A-061. The CES-AES software is available for download at [www.river-conveyance.net](http://www.river-conveyance.net).

This project aims to ensure the scientific relevance of the CES-AES is maintained through:

- Identifying, tracking and assessing relevant new scientific information and technical developments in practice that have the potential to enhance the capability of the CES-AES.
- Scoping how advances can be incorporated into the tools in future developments and software releases e.g. calculation updates, new modules. This was undertaken in close collaboration with the user community to ensure the priority reflects the industry and user needs.
- Identifying software usability updates with indicative costs and timescales (where practical).

Project activities were undertaken in close collaboration with the parallel CES-AES Support and Maintenance project, led by Wallingford Software, and include:

- a series of conveyance and afflux focal point activities (which include significant desk study tasks undertaken as part of the project by experts to assess the available published literature and other accessible knowledge for relevant new scientific information and technical developments in practice);
- stakeholder consultations;
- feedback from training courses, dissemination events and the website e-mail mechanism;
- detailed software testing undertaken in house by Wallingford Software; and
- feedback from the use of the CES-AES software on parallel projects.

### Findings of the project

The report recommends five main areas of further work which target high priority areas from over 75 potential science and software usability enhancements, prioritised following consultation with users in relation to benefits and value for money. The project report sets out the benefits, costs and stakeholder support for these. The areas of further work include:

**1 - Update to the Roughness Advisor:** Develop seasonal vegetation uncertainty curves as well as updates to the River Habitat Survey data, the advice for pools and riffles, the photographic database and the Roughness Review.

**2 - Channel maintenance module:** Develop channel maintenance support to enable exploration of “what-if” scenarios for different management regimes (e.g. cutting, dredging) through additional software functionality and outputs.

**3 - Culvert coefficients and multiple barrels:** Improve the current culvert coefficients which deal with idealised shapes to those which occur in nature; improve the afflux calculation such that it can deal with multiple culvert barrels with different invert or soffit levels; and provide appropriate advice where the first two are not feasible.

**4 - Trash screen and blockage module:** Develop a hydraulic loss unit for dealing with trash screens (including % blocked) and general channel blockage (e.g. debris) and a means to determine the impact on upstream water levels.

### 5 - Software usability and harmonisation:

**Phase 1** - Incorporate a series of software improvements which have been prioritised and given a clear indication of the implementation effort.

**Phase 2** - Incorporate software improvements which will require new knowledge and method development e.g. use of CES calculation at structures.

Four additional areas of further work were identified as the next highest priority:

- Data acquisition programme;
- Development of a habitat module;
- Development of methods and tools to support extension of rating curves; and
- Development of a sediment transport module.

### **Conclusions**

Following an extensive consultation exercise, this project has identified a wide range of potential enhancements and prioritised these into a list of potential areas for further work that would improve the functionality/usability of CES-AES to promote wider use and uptake.

This summary relates to information from project SC070032, reported in detail in the following output(s):

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