



## Real-time flood impacts mapping

### Project Summary SC120023/S

There is growing recognition of the need to provide maps of flood extents and impacts in real time to support improved flood incident management. This project shows that the best way to provide this information is through a combination of pre-made flood maps and simplified flood modelling.

#### Introduction

The Pitt Review (2008), Exercise Watermark (2011) and the Environment Agency's Flood Incident Management Plan (2015) all identified the need for real time information on flood inundation and consequent impact.

This project sought to understand the options available for real-time mapping of flood impacts and how, when and where this information could help support the flood incident response. The focus of this project was on flooding from rivers, although surface water and groundwater were also considered. Options to improve coastal flood forecasting are considered in the joint Defra/Environment Agency R&D project Investigating Coastal Flood Forecasting (SC140007).

The Environment Agency's National Flood Forecasting System (NFFS) supports flood incident management by forecasting river flow and level at specific locations. This project examines how maps could be linked to flood forecasts generated by the NFFS.

#### Consultation

The project worked with emergency planners and responders representing all risk management authorities to better understand their flood incident management needs. We asked users from a broad range of backgrounds about:

- what information they would need to manage a flood incident
- what works and what does not
- what they felt was missing

Two groups were approached to help understand the problem from their different points of view:

- information generators such as Environment Agency flood incident rooms
- information consumers such as Gold and Silver Command centres

All those consulted wanted maps showing forecast flood extents and flood impacts rather than lines on a graph. They also considered time-varying and regularly updated inundation and impact information important. Both groups agreed that any real-time mapping solution must pass 2 fundamental tests:

- It must work in the early hours of the morning, when users are under pressure and possibly tired.
- It must produce information that can be understood by non-technical decision-makers within 10 seconds.

#### Options and proof of concept tests

An expert panel identified 14 feasible options. Six were shortlisted for further investigation based on their fit with user requirements, cost and overall potential:

- fully dynamic fluvial modelling
- simplified fluvial modelling
- simulation library
- 10-day lead time numerical weather prediction (NWP) products
- simplified surface water modelling
- breach risk ready reckoner

Detailed analysis of the options involved comprehensive proof of concept experiments which were designed to answer the questions:

- Is the option technically feasible?
- What information does it provide?
- How well does it perform?

For each option, an evaluation was made of how it could help incident managers respond to a flood, and if the information provided would change the decisions actually made? Three recent flood case studies were used in the testing process. The findings of the detailed analysis from the proof of concept tests are set out in 'pro-formas' provided as appendices to the main report.

#### Preferred options

The most promising proof of concept tests were:

- **Simulation libraries.** These currently have the most potential to meet the user requirements. In this approach, flood extents, depths and impacts

information are selected during an event from a library of pre-computed, detailed flood model results (see schematic diagram overleaf).

- **Real-time simplified fluvial modelling.** This involves running reduced accuracy, but quick-to-run flood models 'on-demand' during an event. These models would be of greatest benefit in situations too complex or dynamic to represent using pre-computed scenarios. This may be a result of the number of variables involved (for example, flood impacts resulting from a breach of defences).

Further details and conclusions from the rest of the options tested are available in the main report and its appendices.

### Implementation

Since the completion of this research, findings have been used to help steer and influence major Environment Agency initiatives such as improvement to flood forecasting projects and the New National Flood Risk Assessment (NaFRA2). They have also helped confirm the validity of existing approaches.

This summary relates to information from project SC120023, reported in detail in the following output(s):

**Report:** SC120023 and 8 appendices

**Title:** Real-time flood impacts mapping

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### Research Contractor:

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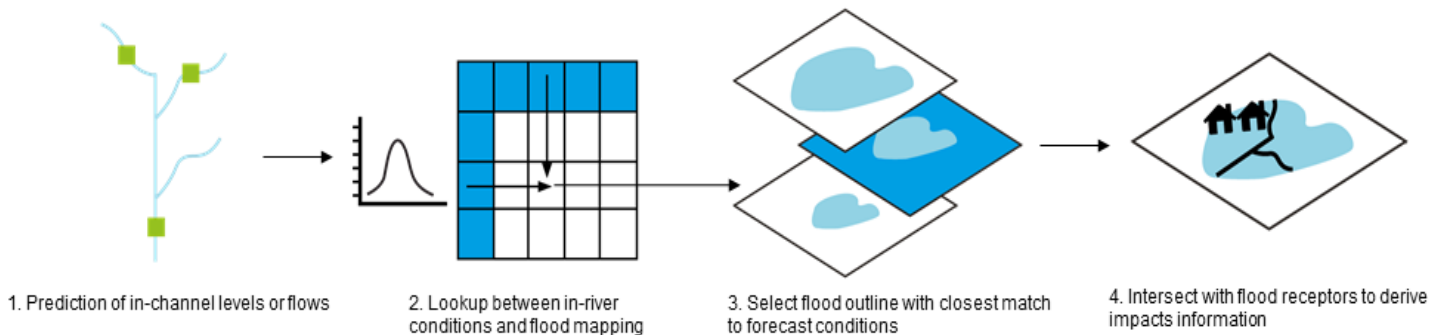
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Preferred option 1: Simulation library– real-time operation