

Flood and Coastal Erosion Risk Management Research Programme

Developing and trialling improved capabilities for forecasting surface water flooding via Natural Hazards Partnership

Project Summary SC120006

The Environment Agency, with partners from the Natural Hazards Partnership, has developed an impact based surface water flood forecasting model.

Around 3 million properties in England and Wales are at risk of flooding from surface water, as well as rail and road infrastructure.

The new forecasting model will support the joint Met Office and Environment Agency Flood Forecasting Centre improve guidance for emergency responders on the potential impacts of surface water flooding.

Lead Local Flood Authorities and Local Resilience Forums play an important role in warning and responding to surface water events. It is important that they and local partners have the best available information about whether a storm is likely to hit their area and the potential impacts.

This summary describes the work completed with support and funding from the joint Environment Agency/Defra research programme.

Background

A Surface Water Flooding Hazard Impact Model (SWFHIM) has been developed to improve incident management for surface water flooding.

The Centre of Ecology and Hydrology led this project in collaboration with the Environment Agency, Health and Safety Laboratory, Met Office and the Flood Forecasting Centre. These all have experience in forecasting flooding and modelling the impacts of hazards.

What the project involved

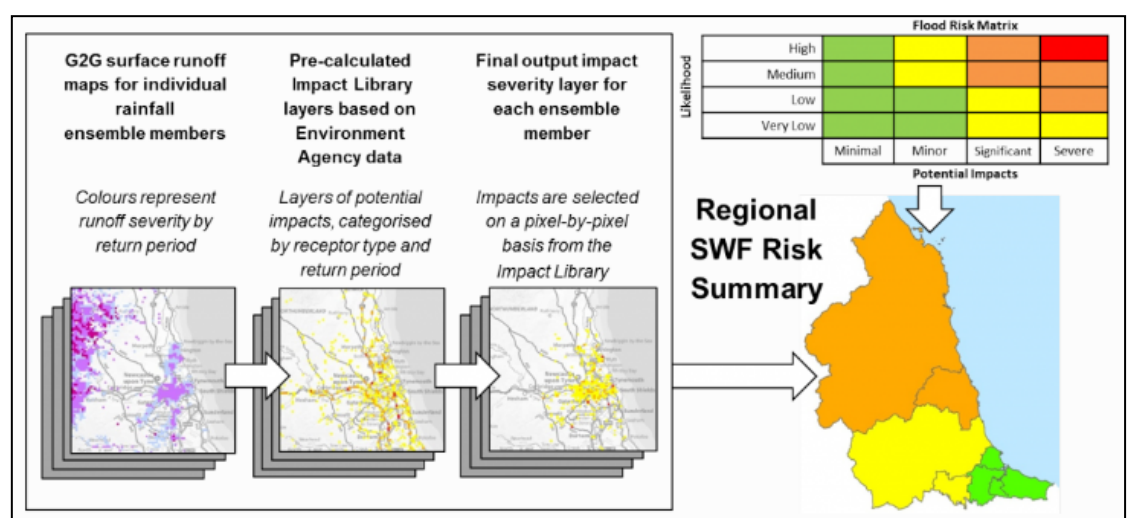
The project developed, tested and trialled an improved real-time forecasting model to show the likely extent of surface water flooding and the impacts to people, buildings, transport and infrastructure.

It used Environment Agency modelling showing areas at risk of surface water flooding under different rainfall scenarios. Property and infrastructure information was used alongside this to determine the possible impacts of flooding.

A pre-calculated impact library of potential flood impact information was created.

The hazard and impact information can be matched to

Figure 1: An illustration of the components of the Surface Water Flooding Hazard Impact Model.



Met Office predictions of likely rainfall. These predictions use the probabilistic Grid to Grid (G2G) forecast model.

Mapped scenarios show different severities of impact. These are used by the Flood Forecasting Centre to produce a county-wide assessment of surface water risk using a Flood Risk Matrix. The matrix is based on the likelihood of a flood occurring and the severity of potential impacts.

The results are presented in the Regional Surface Water Forecast Risk Summary. (See Figure 1 for an illustration of the above steps).

Trial Case Study: Glasgow Commonwealth Games

During development, an early version of SWFHIM model was used and trialled for the 2014 Commonwealth Games in Glasgow. Instead of Environment Agency surface water maps it used information based on the Scottish Environment Protection Agency (SEPA) Regional Pluvial (rainfall-related) Flood Hazard maps to build the impact library.

A specific research team from the Centre of Expertise for Water developed tools to run the model in real-time and report on the likely impacts of surface water flooding. Two surface water incidents happened during the Games and the model performed within expectations.

The trials informed updates to the SWFHIM. It was then tested across England and Wales and implemented by the Flood Forecasting Centre for trials in 2017.

How the SWFHIM will be used

The impact severity maps produced by the SWFHIM will be used to improve the information presented in the Flood Guidance Statements.

Daily Flood Guidance Statements include a 5-day assessment of surface water flood risk at the county level for England and Wales. They forecast situations that could cause flooding, threaten communities and pose a risk to lives and livelihoods.

Both Lead Local Flood Authorities and Local Resilience Forums receive these guidance statements. The resilience forums use the information to support emergency planning and resourcing decisions.

Using the SWFHIM will give greater confidence to the forecasted risk and decisions made based on this.

The Flood Forecasting Centre expect to use the SWFHIM in surface water flood forecasts from 2019.

What this means for the Environment Agency

The SWFHIM will help the Environment Agency deliver its Strategic Overview Role for the management of all sources of flooding, including surface water. The Environment Agency and Met Office are reviewing improvements to surface water forecasting and

communication. They aim to make the best use of the information produced across the Met Office, Flood Forecasting Centre and Environment Agency, such as the SWFHIM. This review was reported in the Defra Surface Water Management Action Plan (2018).

The review will also support the government response to an independent review of Local Resilience Forum Multi-Agency Flood Plans (MAFPs) published on 12 June 2018. Defra guidance will be reviewed and updated in light of the outcome of the MAFP Review.

The impact library approach has also informed other Environment Agency projects including the new National Flood Risk Assessment currently in development.

This summary relates to information from project **SC120006 Developing and trialling improved capabilities for forecasting and alerting surface water flooding via Natural Hazards Partnership.**

This is reported in detail in the following report: 'Natural Hazards Partnership Surface Water Flooding Hazard Impact Model: final report, 2016':

<http://www.naturalhazardspartnership.org.uk/wp-content/uploads/2016/10/NHP-HIM-Surface-Water-Flooding-Phase-2-Final-Report.pdf>

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This project was commissioned by the Environment Agency's FCRM Directorate, as part of the joint Flood and Coastal Erosion Risk Management Research and Development Programme.

This contributed to Phase 1, 2 and 3 of the project 'Natural Hazards Partnership Surface Water Flooding Hazard Impact Model' coordinated by the Natural Hazards partnership and delivered through a consortium of partners.

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