

Estimating flood peaks and hydrographs for small catchments: Phase 1

Project Summary SC090031/S

There are a number of different data sets and techniques available for estimating flood flows for small urban catchments in the UK (area less than 25 km² but includes plots of land which do not form complete catchments and may not contain a watercourse). This scoping study has assessed those methods and states interim recommendations on which method to use. It recommends that in the long term a new method should be developed as part of phase two. .

Flood estimates are required in small catchments in the UK for a wide variety of applications including:

- Flood risk/consequence assessment to meet the requirements of planning guidance such as Planning Policy Statement 25 (PPS25).
- Flood mapping studies.
- Storm sewer design.

It is particularly difficult to obtain adequate flow data for small urban catchments. The Environment Agency's HiFlows-UK dataset provides flood peak data for over 950 gauging stations, but less than 10% are in small catchments.

The project reviews the wealth of guidance documents on small catchment flood estimation that currently exists in the UK. The most up-to-date methods available are those from the *Flood Estimation Handbook* (FEH), which are based on long, reliable gauging station records and were specifically developed to be applicable to a range of catchment sizes and types.

The project found that a number of different methods, some of which were developed more than 35 years ago, are recommended for different applications. In some cases, the guidance to use particular methods seems to be related more to the ease with which they can be applied, rather than to how appropriate a particular method might be.

The conclusions of the scoping study:

- The Flood Estimation Handbook (FEH) methods are applicable across the range of catchment sizes used in their development and thus the continued recommendation of outdated methods such as IH 124 and ADAS 345 is inappropriate.
- Since small catchments are not well represented in HiFlows-UK, further flood peak data for small rural and urban catchments should be sought and analysed.
- flood estimation could be improved by using physical information about local soils and watercourse extent.
- There is scope for improving current hydrological methods, especially in urban areas and in very small catchments.
- A range of approaches is needed to provide estimates of both flood peaks and flood hydrographs.

The following interim recommendations are made:

- Flood estimates on small catchments should be derived from FEH or the Revitalised Flood Hydrograph (ReFH) rainfall-runoff model, except on:
 - highly permeable catchments (BFIHOST>0.65), where ReFH should be avoided.
 - On urban catchments (URBEXT₂₀₀₀>0.15), where the results of the ReFH model can be less reliable.

Checks should be carried out to ensure that the flood estimates are within expected ranges based on the history of flooding and the capacity of the channel (including evidence from previous flood marks).

For catchments smaller than 0.5 km² and small plots of land, runoff estimates should be derived from FEH methods applied to the nearest suitable catchment above 0.5 km² and scaled down. This should be accompanied by an assessment of whether the study site is representative of the surrounding catchment area.

The scoping study was jointly funded by the Environment Agency, the Centre for Ecology & Hydrology and JBA Consulting, and its conclusions are likely to be of interest to staff at these organisations as well as to others, such as local authority planners, whose work includes consideration of flood risks in small catchments.

Catalogue information:

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