

# URBEXT<sub>2000</sub> – A new FEH catchment descriptor Calculation, dissemination and application

Technical Summary: FD1919

## Joint Defra / EA Flood and Coastal Erosion Risk Management R&D programme

### Background to R&D project

The Flood Estimation Handbook (FEH) procedures are widely used for design flood estimation in the UK. Catchment descriptors quantify physical and climatological characteristics and play a key role in the Handbook methodologies. Urbanisation will often have considerable effect on the downstream flood regime and the FEH catchment descriptor defining urban extent (*URBEXT*), provides a basis for taking account of this effect within the procedures. *URBEXT* values for over 4 million sites in the UK are made available to practitioners on the FEH CD-ROM. The land cover data used in the derivation of *URBEXT* during the FEH research programme were based on satellite imagery taken around 1990. The release of the CEH Land Cover Map 2000 (LCM2000) provided an opportunity to bring the indexing of catchment urbanisation up to date.

The principal objectives were to develop a new index describing urban extent based on these data (*URBEXT<sub>2000</sub>*), to make the values available by releasing a new FEH CD-ROM, and to provide new FEH procedures based on *URBEXT<sub>2000</sub>*. Furthermore, the production of a new FEH CD-ROM provided an opportunity for FEH users to benefit from the improvements made to the Digital Terrain Model (DTM) used to define catchment boundaries. Consequently, an important secondary aim was the recalculation of catchment values using newly-defined boundaries for all existing descriptors.

### Results of R&D project

The work carried out under the project has brought improvement to the FEH procedures in a number of ways. Stage 1 of the project culminated in the provision of a land cover dataset that would allow a key index describing catchment urbanisation to be updated. Stage 2 of the research programme saw the development of an index describing the extent of catchment urbanisation based on the new data; known as *URBEXT<sub>2000</sub>*. Index values were subsequently derived for all UK catchments of at least 0.5 km<sup>2</sup>. This fulfilled the primary objective of providing a catchment descriptor that defines urban extent and is based on the most recent national digital land cover data available.



The new *URBEXT*<sub>2000</sub> values are made available to FEH users through the release of a new FEH CD-ROM, which also includes recent advances to the DTM which defines catchment boundaries and drainage paths. Catchment values of *URBEXT*<sub>2000</sub> and existing descriptors have been derived using the improved DTM and are provided on the new FEH CD-ROM. The software also includes new and improved functionality.

The new descriptor *URBEXT*<sub>2000</sub> is not simply an update to *URBEXT*<sub>1990</sub>, it is derived from data produced using different mapping techniques and typically the same level of catchment urbanisation will result in higher values of *URBEXT*<sub>2000</sub> than *URBEXT*<sub>1990</sub>. Consequently, revised procedures, based on *URBEXT*<sub>2000</sub>, were developed for the adjustment of the as-rural index flood and growth curve within the FEH Statistical Method, where the subject site is urbanised.

## R&D Outputs and their Use

The FEH CD-ROM lies at the centre of both the FEH rainfall-runoff and statistical procedures. A key output of the project is the release of a new version of the FEH CD-ROM. This will give FEH users access to the improved and updated index of urban extent, developed and computed as part of this research programme. The CD-ROM also includes descriptor values that have been calculated using drainage paths and catchment boundaries defined by an improved DTM. Additional and enhanced functionality is also provided with this release. It is anticipated that users of the FEH CD-ROM, including the Environment Agency, local authorities and consulting engineers, will wish to upgrade to version 2.0.

It is recommended that the urban adjustment procedures based on *URBEXT*<sub>2000</sub>, described in Defra/Environment Agency R&D Technical Report FD1919/TR for use within the FEH Statistical Method, should supersede those based on *URBEXT*<sub>1990</sub>. The statistical procedures can be implemented by using the software package WINFAP-FEH and the revised adjustments for urban catchments have been incorporated into the next release of the software.

The benefits to Defra/Environment Agency are that important improvements to key elements of the FEH procedures and software have been provided, which should reduce the uncertainty of flood estimates.

This R&D Technical Summary relates to R&D Project FD1919 and the following R&D output:

**R&D Technical Report FD1919/TR – URBEXT<sub>2000</sub> – A new FEH catchment descriptor.**

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The above outputs may be downloaded from the Defra/EA Joint R&D FCERM Programme website ([www.defra.gov.uk/envirom/fcd/research](http://www.defra.gov.uk/envirom/fcd/research)). Copies are also available via the Environment Agency's science publications catalogue (<http://publications.environment-agency.gov.uk/epages/eapublications.storefront>) on a print-on-demand basis.

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