

Inland flooding in the U.K. is frequent and often severe, as witnessed over the last decade. Losses from flood events can accumulate significantly, and U.K. flood risk continues to increase due to accelerated development in river floodplains. The RMS® U.K. Inland Flood Model captures the correlation of loss for all sources of flood risk and incorporates the latest generation of flood modeling at RMS to provide the high-resolution capability to price and underwrite policies and manage portfolio accumulations.

## U.K. Inland Flood

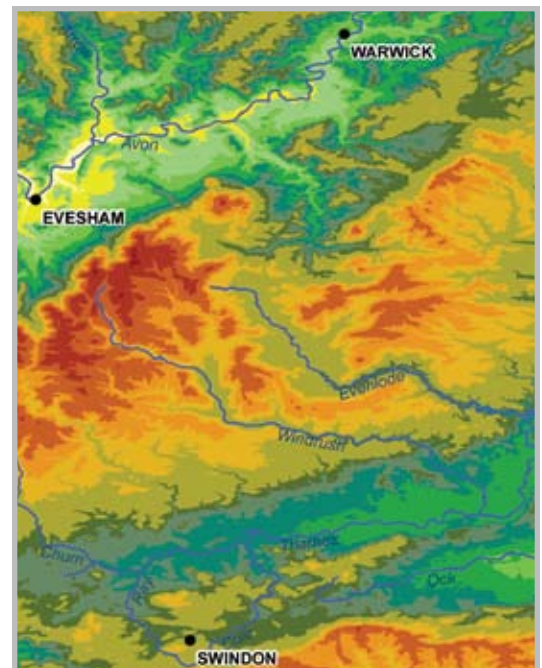
Inland flooding is a principal cause of catastrophic loss in the United Kingdom. Several major flooding events have struck over the past ten years, culminating in the devastating summer 2007 floods. Based on several years of extensive research, the fully probabilistic RMS® U.K. Inland Flood Model employs new numerical modeling approaches to cover all sources of flood risk, physically modeling major river flooding as well as flooding from rapidly responding minor rivers, surface water flow, rising groundwater levels, and drainage overflow in urban areas. Around 1 million kilometers (over 600,000 miles) of river and surface water flow are physically modeled, resulting in highly realistic flood footprints.

### PAN-EUROPE RAINFALL EVENTS

A country-wide stochastic event set is derived from the RMS time-stepping, pan-European precipitation model, which simulates 100,000 years of flood-causing rainfall across Western Europe. The model fully represents all possible scenarios from long-duration winter rainfall events (which may fall as snow), summer rainfall events, and localized thunderstorms. As part of an extensive research effort, RMS reconstructed 45 years of Europe-wide rainfall to ensure consistent spatial and temporal patterns in the stochastic precipitation fields and realistic correlation of rainfall within the U.K. and across Europe.

### FULL HYDRODYNAMIC FLOOD MODELING

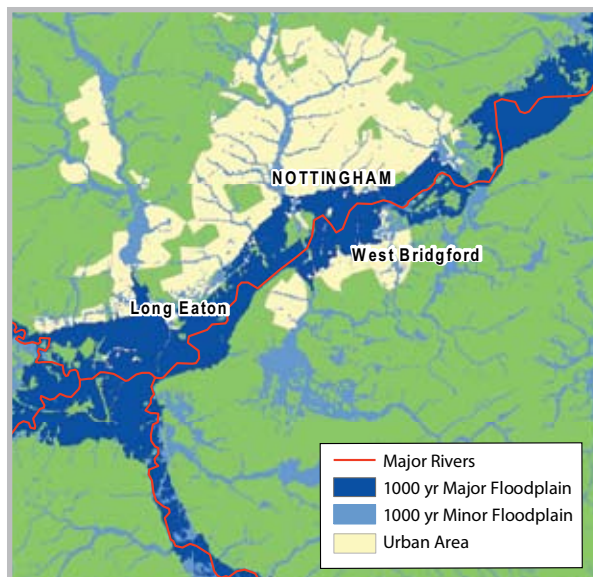
The model captures all processes in the precipitation-runoff-inundation chain end to end by continuously modeling hydrodynamic processes over long time periods. Hydrological modeling is conducted on a country-wide 10-meter digital terrain model, which has been subject to rigorous quality testing and enhancement. By using long-time series modeling, the seasonality of all components of the water cycle and the impact of antecedent conditions on the next event are accounted for.



*10-meter digital terrain model enables high-resolution flood modeling*

Water entering the major river network is routed downstream using a numerical model. The presence and potential failure of defenses and their impact on downstream flows and flooding is accounted for within the inundation model. Recognizing the importance of detailed defense information, RMS has invested significant effort to obtain the complete Environment Agency defense database and implement this information in the model.

Flooding on minor floodplains is particularly important for flash flooding events, contributing up to 100% of an event loss. A hydrodynamic model is used to physically model the flow and inundation on minor floodplains from all other rivers, streams, and surface water flow, and captures areas of ponding from surface water flooding. Residual flood losses are captured through the off-floodplain semi-actuarial model.



*Complete and accurate flood risk assessment must include all sources of flood risk*

## DETAILED RISK DIFFERENTIATION

The U.K. Inland Flood Model offers high-resolution modeling up to 50-meter resolution, allowing clients to benefit from street address level data. Three hundred unique damage functions relate the flood severity to the level of damage considering the building occupancy, height, age, and construction type. Post-event loss amplification effects are also included. Clients can further differentiate the risk using flood-specific secondary modifiers such as the presence of basements and contents vulnerability to water. Within multi-story buildings, damage can be modeled according to the floor covered, enabling more accurate loss calculations. Where detailed risk information is not available, the model relies on a comprehensive building inventory to identify the likely building characteristics given the risk location and refine the damage estimate.

RMS provides a complete set of targeted U.K. inland flood products for the insurance industry to improve underwriting, portfolio management and risk transfer decisions:

- RiskLink®-DLM and ALM
- Flood Risk Assessment Maps
- Peril Rating Products

# Model Specs

## HISTORY

Original release 2001, upgraded in 2008

## GEOGRAPHIC SCOPE

U.K., excluding Northern Ireland, the Channel Islands, and the Isle of Man

## GEOCODING RESOLUTION

Latitude/longitude, street address, Postcode (unit & sector), district, city, county, and CRESTA zone

## LINES OF BUSINESS AND COVERAGES MODELED

25 residential, commercial, industrial, and agricultural line occupancies, including municipality buildings; buildings, contents, and time element losses