



U.K. Floods, November, 2000

Preliminary Report of U.K. Flood Damage From
Increased Rainfall in November 2000.

RMS

Risk Management Solutions

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INTRODUCTION

Windstorms at the end of October and beginning of November triggered two weeks of widespread and severe flooding in the U.K. from October 31 to November 16, 2000. RMS estimates that the insured loss from this event could reach £500 million (US\$738 million), based on an RMS best-estimate footprint of flooded sectors representing a total of up to 8,000 flooded properties (Environment Agency, November 13 2000), detailed RMS surveys of previous flood damage, and known insurance losses. The November flooding was the most widespread and in some places the most severe since 1947. Closely following an earlier severe flood on October 13-14, the November storms resulted in the flooding of many towns in southeast England, many of which were flooded in the previous event¹. The flooding caused widespread disruption to the transport network in England and Wales, but damage was the most severe in northeastern England, North Wales, the Midlands and southern England.

¹ See RMS' report "U.K. Floods, October 13-14, 2000" (November, 2000)....

METEOROLOGY AND HYDROLOGY

An average of 492 mm (19 inches) of rainfall fell over the U.K. in the autumn of 1999, making it the wettest autumn since records began in 1766¹. This is equivalent to 191% of the long-term (thirty-year) average rainfall. The month of October was particularly wet throughout England and Wales, with 200-year return period rainfalls recorded in the southeast and north of England (U.K. Meteorological Office). Rainfall in October was characterized by a large number of days with over 25 mm (1 inch) of rainfall in short succession. There were also a series of exceptional rainfall events associated with depressions passing over the U.K. on October 9-12 and October 29-30, then subsequently on November 5-9, which triggered flooding.

The flooding that occurred from October 31 to November 16 was triggered by the storms on October 29-30, when exceptional rain fell on catchments that were already saturated by 2-3 times average monthly rainfall and that had already suffered flooding in some places. Two more frontal rain events brought rainfall and flooding as they crossed the country in short succession, and culminated in the November 5-9 track stationing itself over the North Sea. This led to severe and persistent flooding in northeast England. During this period the Environment Agency issued the greatest number of Severe Warnings yet for one event (Figure 1). Many river flows exceeded 200% of the long-term average during October, and in some cases the recorded maximum was exceeded. Soil moisture deficits had been replenished by the second week of October, and exceptional groundwater recharge led many normally dry springs to begin to flow again.

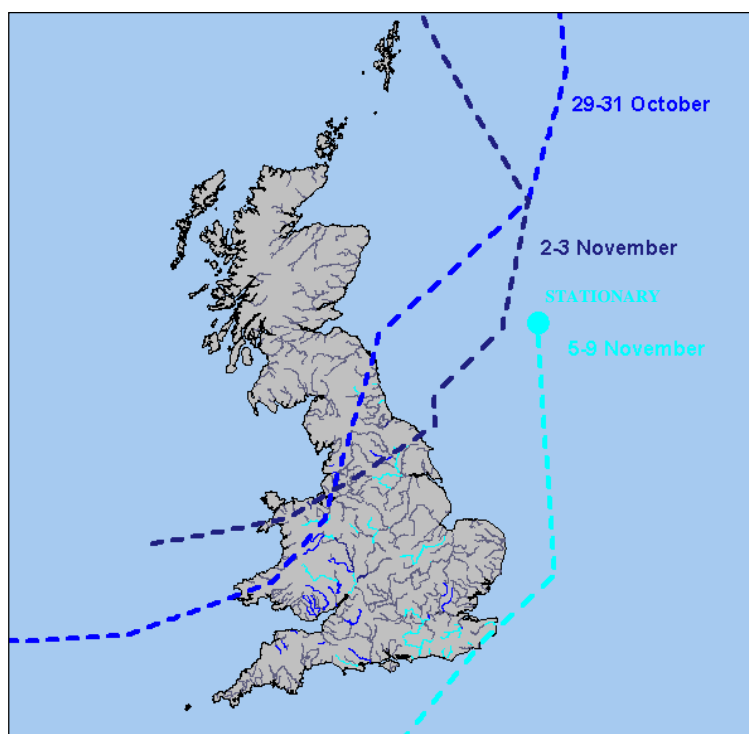


Figure 1. The progressive increase in the number of rivers under a Severe Warning flood alert is shown as related to the three principal rain-bearing depressions that passed over the U.K. in late October and early November.

¹ U.K. Meteorological Office Precipitation Index

HISTORICAL AND FUTURE EVENTS

The flood event of October 31- November 16 is the most widespread event since 1947, and in certain places the most severe since that date. Although the rainfall total of October is similar to that of March 1947, the events differ fundamentally in nature. Unlike the November 2000 event, the flood of March 1947 resulted from heavy rainfall combined with the rapid thaw of snow (up to 5m (16 ft) deep) that covered the whole country between January 27 and March 13. In March 1947 over 3,000 properties were flooded in Oxford alone, and some 1,000 km² (386 mi²) of farmland was under water for up to three months. Prior to 1947, three similar events occurred in the second half of the 19th Century where prolonged rainfall led to widespread flooding throughout England in the month of November, namely 1894, 1875, and 1852. In 1894, up to 75 mm (3 inches) of rain fell every day in southern Britain between October 23 and November 16, leading to severe flooding throughout central and southern England. In 1875, Banbury station was flooded five times between October 11 and November 14.

It is clear from the historical record that the October 31 – November 16 event is not unprecedented, and persistent flooding is not an indicator *per se* of climate change. It is quite normal for the autumn to be a time of increased flood risk in the U.K., as the surface of the northern Atlantic Ocean preserves its summer warmth into October, and therefore frontal systems have the capacity to carry more rain than later in the winter. Although there is no evidence of any significant correlation between monthly rainfall totals for the U.K., the risk of flooding during the remainder of this winter will remain higher than usual due to the saturated condition of catchment soils.

FLOOD DAMAGE ASSESSMENT

The RMS current best-estimate footprint of flooded sectors has been derived from information from the Environment Agency, Local Authorities, insurance companies and the press (Figure 2), and shows that a large part of England and Wales was affected by flooding. Regional hotspots of severe damage are evident on the Ouse, Derwent and Aire rivers in northeastern England, the Dee in North Wales, the Severn and Trent in the Midlands, and a large number of rivers in southern England, including the Thames, Beult, Teise, Rother, Uck and Ouse. The South West and North West of England were less severely affected.

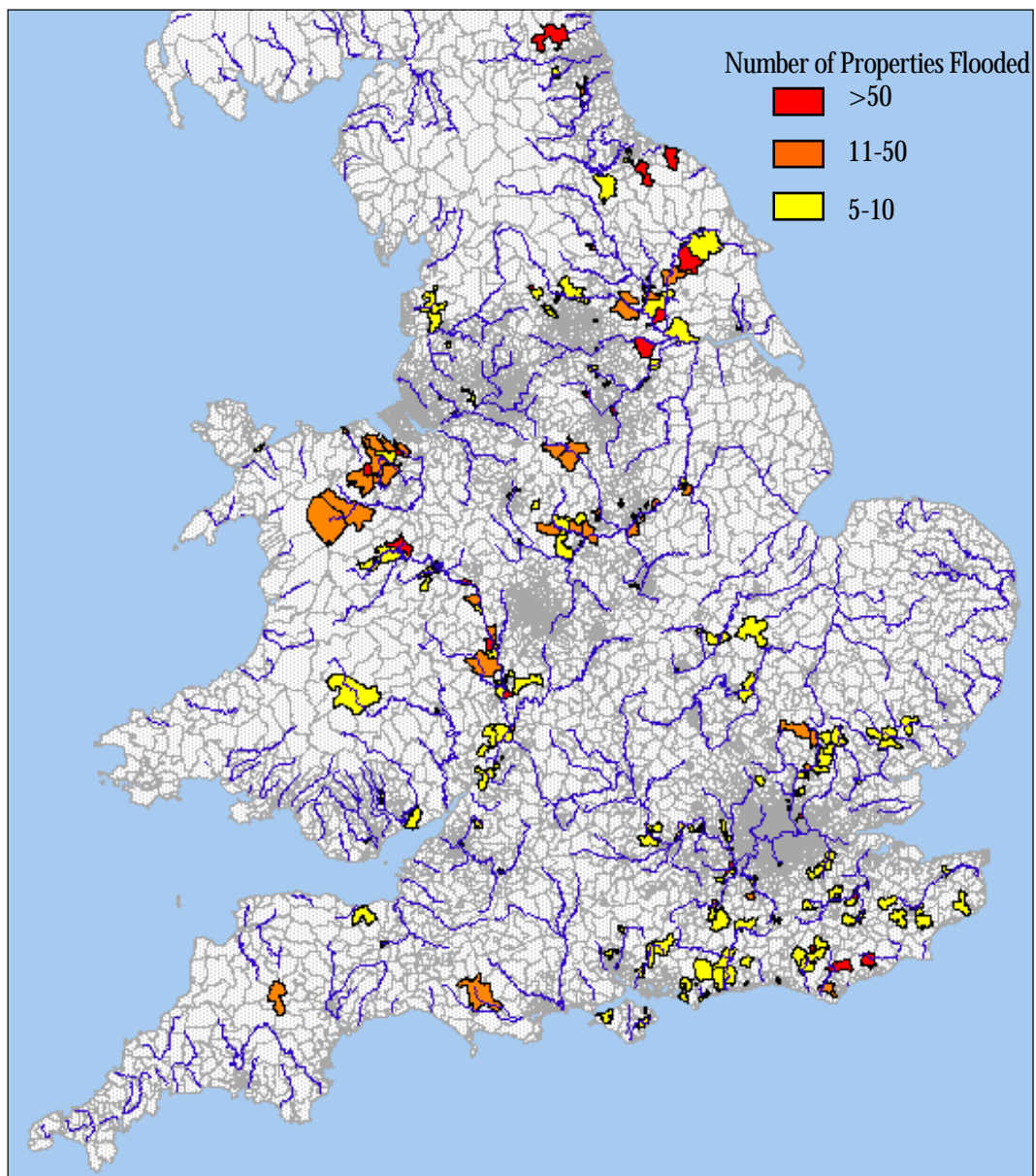


Figure 2 Map showing the RMS current best-estimate footprint of flooded sectors during the October 31 - November 16 event.

RMS estimates that the insured loss from the October 31 – November 16 flood event will be up to £500 million, based on information from the Environment Agency that up to 8000 properties were flooded (November 13), and on detailed RMS surveys of damage during previous floods and known insurance losses. It is difficult to be precise about this loss because the flood experience varied considerably regionally and locally, and although likely to be high, business interruption losses are a source of uncertainty. In certain areas such as East Sussex and Kent in South East England the flooding was repetitive, many towns having only begun to recover from severe flooding earlier in October. The rapid succession of events therefore probably reduced the material damage but increased business interruption costs due to a delayed recovery. In other places such as Gowdall on the River Aire about a hundred properties were underwater for two weeks, increasing the building damage from prolonged contact with the floodwater. In addition to river flooding, many areas were affected by flooding from surface water and blocked drains, exacerbated by the fallen trees and windblown debris from the windstorms of October 29 and November 5.

The Environment Agency undertook a large-scale operation to monitor, forecast and issue flood warnings, to evacuate those properties at risk, and to maintain, repair and extend defenses during the event. Over 100,000 sandbags were used to protect properties and to heighten defenses in Yorkshire alone. Overall, the Environment Agency flood defense operation was effective in mitigating the full potential impact of the flood, as there were no fatalities. In the North East, one of the worst affected regions had 2,500 properties flooded, yet over 20,000 properties were estimated spared directly due to defenses. The fact that flood defenses were repaired and extended continuously throughout the flood event was important in reducing potential losses. The defenses were subjected to conditions close to design standards for a prolonged period of time, which lead to an increased risk of seepage and failure. In certain areas, mitigation during the flood was successful in preventing large scale flooding, such as in Chichester (Figure 3). It is clear that a flood event of even a slightly greater magnitude would have overtopped and/or breached many defenses, causing a significantly greater loss. This event has highlighted the related issues of the role and funding of flood defenses and the siting of new developments in the floodplain.



Figure 3 A pumping operation was successful in preventing major flooding of Chichester.

EVENT DEFINITION

The October 30 – November 16 flood event overlapped two wind storms, for which the Lloyds Market has defined the clauses 168 and 36 hours respectively, beginning on October 29 and November 5. The hour clause for the October 30 – November 16 flood event has not yet been defined, reflecting the difficulty in determining a start and end date for a flood event of relatively long duration and widespread geography. It is likely that separate hours clauses will be defined for different parts of the country, as overall the event lasted more than the standard 168-hour clause. Until the event has been defined, the proportion of losses suffered by insurers and reinsurers respectively from the flood event of October 30 – November 16 remains unclear.

CONCLUSION AND ACKNOWLEDGMENTS

The October 30 –November 16 flood event was due to a combination of saturated catchments during the wettest autumn on record since 1766 and a series of frontal systems bearing exceptional rain. The RMS estimate of an insured loss from flood of up to £500 million reflects the widespread nature of the flooding, although regional concentrations of damage are apparent from the RMS best-estimate footprint of flooded sectors. The severity and persistence of flooding varied regionally and locally, with additional flooding originating from surface water and blocked drains. The final breakdown of insured loss will be affected by the event definition set for reinsurance assessment purposes. It is clear that the Environment Agency flood defense operation was effective in mitigating the full potential impact of the flood, which stretched existing flood defenses to the full in many areas, especially in northeastern England. The historical record reveals that this event is not unprecedented, floods of similar magnitude having occurred in previous years, under similar conditions during the month of November. Although there is no evidence as yet to suggest that global warming is directly contributing to increased flood risk, the insured risk from flooding is increasing due to changes within catchments and river channels, including urban development. As yet there is no evidence of any significant correlation between monthly rainfall totals in the U.K., but the saturated condition of catchment soils will ensure that the risk of flooding during the remainder of the winter will remain higher than average.

Acknowledgments

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