Developing the evidence base for flood resilience

Technical Summary: FD2607

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

Background to R&D project

Entec UK and Greenstreet Berman were commissioned in June 2007 to undertake a research project entitled "FD2607 – Developing the evidence base for flood resistance and resilience". This project was intended to provide analytical information for the wider Making Space for Water projects, RF1 and RF2 (encouraging and incentivising uptake of resistance products and resilience measures by households and businesses). It should be noted that the primary focus of the research is the application of flood resistance and resilience to existing properties rather than new development.

A key element of the project was the examination of the effectiveness of resistance and resilience measures in reducing flood risk over the long term. This involved developing a new economic model to quantify the costs and benefits of resilience and resistance at a property level. The model was developed for both residential and selected commercial properties and facilitated the quantification of property-scale benefits and costs for different packages of flood resistance and resilience measures. The study has also investigated a wider range of issues (including current awareness of flood resistance/resilience; impact of insurance; access to information etc) which have influenced the existing use of resistance and resilience methods and how these factors could influence the adoption of these measures in the future. These issues were investigated through a stakeholder survey (including insurance, loss adjusters; National Flood Forum; CIRIA and RICS representatives) and a telephone based survey of 1131 residential and commercial properties within significant flood risk areas of England.

Results of R&D project

The key findings of the research were:

- Measures designed to keep water out of the individual properties (resistance measures) are economically worthwhile for properties with an annual chance of flooding of 2% or above (50 year return period). The largest percentage savings are for residential properties with an annual risk of flooding of 4% or greater (25 year return period). For households that flood more than once in every ten years, the benefits outweigh the up-front investment by a factor of between five and ten, while for the average office-based business they outweigh the up-front investment by between six and eleven times.
- Temporary resistance measures (i.e. temporary flood guards and airbrick covers) reduce the costs of damage by about 50% if they are properly deployed prior to a flood. Additional investment in permanent resistance (i.e. permanent floodproof doors, windows and airbrick covers) increases the proportion of prevented damage to between 65% and 84%, but these measures are not as cost-beneficial as temporary resistance measures due to the higher investment costs.

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- In contrast, a full package of resilience measures (i.e. the use of flood-resilient plaster, resilient kitchens and resilient flooring) will only be economically worthwhile when installed in a building that has a greater than 4% annual risk of flooding or that has a greater than 2% annual risk and is in need of repair or refurbishment. In the latter case, the extra cost of resilience is relatively low. Building in resilience without the driver of refurbishment or repair was not found to be desirable.
- However, householders' and businesses' perceptions of the benefits and costs of these measures are influenced by a range of other factors not included in the economic analysis (above). These include the payment of VAT for the purchase of products, a tendency to discount future benefits more heavily and the responsiveness of insurance terms to the particular risk circumstances of individual properties. Sensitivity analysis suggested that, of these factors, insurance is the most influential. Where insurance terms accurately reflect the flood risk, measures are equally as cost-beneficial from the individual's point of view as they are from the societal point of view (i.e. beneficial for properties subjected to an annual risk of flooding of 4% or greater), but where they do not, resistance and resilience measures only become cost-beneficial to the individual householder or business at a 10% annual risk of flooding.
- A telephone based survey of 1,131 individuals showed that many householders and small businesses in areas of significant flood risk recognise the benefits of property-level measures, including the potential long-term financial savings, greater feelings of safety and reductions in the disruption caused by floods.
- However, the survey also showed that many people are deterred from taking action because they feel they are expensive or not their responsibility. Householders and small businesses also identified a wide range of other factors that deter people from protecting their properties, including not knowing the right property-level measures to use, concerns about impacts on the appearance of the property, not wishing to be reminded of the risk, and concern that such measures might adversely affect property values or make them hard to sell.
- The resistance/resilience measure of which households and businesses were most aware was the sandbag (Businesses – 33% flooded, 54% non-flooded; Households – 36% flooded, 60% non-flooded). This is in spite of the fact that most flood management experts consider sandbags to be a largely ineffective resistance technique. In addition, less than one in four surveyed were able to recall any resistance measures other than sandbags and only one in ten could think of an example of a resilience measure.
- Flooded households in the survey were much more likely than un-flooded households to have taken resistance and resilience measures, mirroring previous research (Harries, 2007) that highlighted the importance of flooding in promoting subsequent action. 27% of flooded households said that they had taken some measures to reduce the impact of flooding, while only 6% of non-flooded households had taken some steps.

R&D Outputs and their Use

The findings of the project will be used to inform the development of Defra's impact assessment and planned consultation on flood resistance and resilience issues during Summer/Autumn 2008. The research received the support of a number of organisations including the Association of British Insurers; Davis Langdon; Flood Ark Ltd, Floodgate Ltd; Floodguards Systems Ltd; Flood Protection Association; National Flood Forum; Norwich Union and the University of Dundee. The final results of the study will also be presented at a number of flood risk management conferences, including the Defra Flood & Coastal Management 2008 conference (July 2008) and FloodRisk 2008 conferences (September 2008).

This R&D Technical Summary relates to R&D Project FD2607 and the following R&D output:

R&D Technical Report FD2607/TR – Developing the evidence base for flood resistance and resilience. Published June 2008

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The above outputs may be downloaded from the Defra/EA Joint R&D FCERM Programme website (www.defra.gov.uk/environ/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.