Improved flood resilience of buildings – BS 85500

Andrew Tagg, Technical Director & Chairman of CB/501

3rd August 2016
Flood risk management in context

The role of flood resilience

BS 85500
“Flood resistant and resilient construction”
The flooding system exhibits **spatial complexity**

**Flood Risk Management**

- **Flood resistant housing**
- **Storms**
- **Runoff**
- **Watercourse**
- **Sewer System**
- **Flood banks**
- **River**
- **Flood plain**
- **Estuarial defences**
- **Urban infrastructure e.g. Road kerbs**
- **Conservation measures**
- **Coastal development**
- **Coastal defences**
- **Evaporation**
- **Sea**
- **Waves**
- **Waves, sea level and surge**

**Infrastructure** controls flood risk to receptors

**Flood Risk Management addresses**

- **Source**
- **Pathways**
- **Barriers**
- **Receptors**

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Portfolios of responses are now recognised as fundamental to effective FRM where:

- The advantages of one option compensates for the disadvantages of another

Accept

Severe Flood Warning

Insurance

Land use management

Development regulation
Hierarchy of FRM Measures

Avoid the risk
- Allocate vulnerable developments to areas of least risk

Substitute the risk
- Use less vulnerable development types

Control the risk
- Reduce flood probability

Mitigate the impacts of the risk
- Manage the residual risks

Assess → Avoid → Substitute → Control → Mitigate

Planning

Resistance & Resilience
Need for resistance & resilience measures
Flooding in England: A National Assessment of Flood Risk

5.2m at risk (now 5.4m)

2.8m surface water only (now 3.9m from SW in total)

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Testing of flood resistance products
Drivers for resistance products & testing

Large number of ‘at risk’ properties that will not be protected by major schemes

Defra grant scheme for Local Authorities (2008 launch)

Drive innovation by the manufacturers

Update of PAS1188 (2014)
Resilience of buildings – BS 85500

Slide Layouts available with native PowerPoint
#11 Building Regulations should be revised to ensure that all new or refurbished buildings in high flood-risk areas are flood resistant or resilient;

#12 All local authorities should extend eligibility for home improvement grants and loans to include flood resistance and resilience products for properties in high flood-risk areas;

#13 Local authorities...should encourage the take-up of property flood resistance and resilience by businesses.
Wall ME1 (Eng Bricks on external face and Concrete blocks on internal face) during wet test
May 2007
Launched by Minister

Also unpublished ‘sister’ document on resilient modern methods of construction
BS 85500:2015

Flood resistant and resilient construction – Guide to improving the flood performance of buildings

BS 85500, Flood resistant and resilient construction – Guide to improving the flood performance of buildings

Core document

0 Introduction
This Core Document has been created to help identify when flood resistant and resilient construction is appropriate and to give guidance on achieving these. It is applicable to new buildings, extensions and the retrofitting of existing properties.

It is based on BS 85500:2015 but contains only the main principles and applies to straightforward situations only. More extensive guidance, including the assessment of less straightforward situations is given in BS 85501.

National and local planning policies discourage inappropriate development in areas at risk of flooding. Neither this Core Document nor BS 85500 promote development in flood risk areas. Instead, they provide guidance on reducing the potential consequences where buildings are located in an area at risk of flooding after other measures or approaches, such as avoiding risk, locating development in an area of low risk or raising floor levels, have been implemented.

1 Terms and definitions
1.1 Flood resistance
construction of a building in such a way as to prevent or minimize floodwater entering the building and damaging its fabric
EXAMPLE
Use of low permeability materials

1.2 Flood resilience
measures that can be incorporated into the building fabric and/or fixtures and fittings that can be installed, to reduce the consequences of floodwater entering the property
EXAMPLES
Use of sacrificial materials for internal or external finishes, e.g. gypsum plasterboard placed so that it can easily be removed below the flooded level and replaced, or materials that can resist the effects of flooding, e.g. fire finishes.

Available from http://shop.bsigroup.com/
Design Strategies

Select appropriate methods based on FRA or building survey

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<th>Design floodwater depth above ground floor level</th>
<th>Measure</th>
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<td>Less than 300 mm</td>
<td>Resistance A)</td>
</tr>
<tr>
<td>300 to 600 mm</td>
<td>Resistance + resilience</td>
</tr>
<tr>
<td>More than 600 mm</td>
<td>Resilience + resistance for lesser events</td>
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A) Groundwater and long duration flooding could additionally require resilience

Resistance
Resilience
Repairable

Flood source
- Groundwater
- Drainage system
- Sea
- Rivers and watercourses
- Infrastructure failure
- Overland flow

Time
- Hours
- Days
- Weeks
- Months
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Bibliography
Benefits of new standard

Addresses the current absence of building regulations to adequately address flooding in new developments

Promotes innovative design solutions for flood resilient properties

Useful to planners and building control officers in local authorities, large planning consultancy practices and loss adjusters, seeking to address the ‘disconnect’ between planning requirements and building regulations

Promoting the use of materials and construction elements that are more resilient to floodwaters

Minimising delays in reoccupying properties after flooding, which can have a profound impact on the health and livelihoods of those affected

The potential to reduce business losses as a result of reducing the impacts of flood events

The potential to reduce the risk of mould and other health risks related to flooding impacts which will likely increase as a result of climate change

The potential to save energy as a result of reducing the need for excessive drying and restoration of flooded properties
Cost implications (Defra, 2008)

Typical damage functions for use of resistance and resilience measures
Resilient House (1)
Resilient House (2)