

Department for Environment, Food and Rural Affairs

Practitioners' Handbook for Low Cost Repairable or Resilient Reinstatement For Surveyors and Local Authorities

January 2016

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Introduction

Government support will soon be available to local authorities to help them design locally tailored support packages for flood victims. Grants will be available to fund measures which improve the property's resilience or resistance to damage from flooding, over and above repairs that would normally be covered by insurance.

What is this guide?

This sourcebook provides a summary of measures that may be used to limit damage once floodwater enters a property. The measures have been identified within the Defra technical evidence review as part of the Defra research project FD2682. This review drew on existing guidance, professional and practitioner experience and the evidence from a small number of households that have had measures installed in the past. There are many more approaches that can be used than are included in this handbook (see information sources below). The measures included here have been assessed to have the potential to be installed at no, or no significant, extra cost over like for like reinstatement in different types of property typically found in the UK.

What is the purpose of the guide?

The sourcebook is designed to be a convenient summary of potentially appropriate alternative approaches to reinstatement that will reduce the cost and disruption of future flood damage. It includes a checklist for surveyors to use in informing their discussion with flood affected households and small businesses during the reinstatement process. This sourcebook is not designed to be a comprehensive technical manual, as most of the approaches and materials described within this handbook are within the technical competencies of building surveyors. It is intended to highlight those approaches meriting consideration when dealing with flooded properties that are likely to flood again in the future.

The suitability and cost of the different approaches listed here will vary significantly for each individual property, flood risk situation and householder or business owner. This handbook provides a range of approaches that are considered to be low cost options. It is envisaged that surveyors will use their professional judgement and to determine the best and most cost effective reinstatement plan for each property.

Where can I get more information?

Relevant standards include:

- BS 85500, Guide to Improving the Flood Performance of Buildings. A core standard document is available to download free of charge. <http://goo.gl/fPAxWT>
- PAS1188 Flood Protection Products. Specification. Building Aperture Products or similar standards. <http://goo.gl/xqY5p9>

The handbook and documents above drew on several key existing guidance documents for suggested approaches:

- GARVIN, S., REID, J. & SCOTT, M. 2005. Standards for the repair of buildings following flooding. London: Construction Industry Research and Information Association CIRIA
- ASSOCIATION OF BRITISH INSURERS 2003. Assessment of the cost and effect on future claims of installing flood damage resistant measures. London: Association of British Insurers.ABI
- DHONAU, M. & ROSE, C. B. 2014. Homeowners' Guide to Flood Resilience (3rd edition 2014) [Online]. Know Your Flood Risk Campaign. Available: <http://goo.gl/8MSUDQ>
- BRE Good Building Guide (GARVIN S and HUNTER K), Applying flood resilience technologies (GG 84), 1984 (www.brebookshop.com)
- BRE Digest 523 (GARVIN S): Flood-resilient building (www.brebookshop.com)
 - Part 1 – Legislation, planning, flood-risk assessment and performance of buildings DG 523-1 (2012)
 - Part 2 – Building in flood-risk areas and designing flood-resilient buildings DG 523-2 (2012)
- BRE Good Repair Guide 11, Repairing flood damage, 1997.

Property Level Resistance

- Best Practice in Property Level Protection Systems Advice for Local Authorities. Defra, 2014
- May P., Phil Emonson P., Jones B. and Davies A. Post-Installation Effectiveness of Property Level Flood Protection FD2668 Defra, 2014

- White, I., O'Hare, P., Lawson, N., Garvin, S., and Connelly, A. 2013. Six steps to flood resilience – guidance for local authorities and professionals. Manchester.
- White, I., O'Hare, P., Lawson, N., Garvin, S., and Connelly, A. 2013. Six Steps to Property Level Flood Resilience – Guidance for Property Owners. Manchester, UK. ISBN: 978-1-905469-82-6
- Stevens R., Chatterton J. and Ogunyoye F. Assessing the economic case for Property Level Measures in England. London. Committee on Climate Change, 2012. See link - <https://www.theccc.org.uk/archive/aws/ASC/2012%20report/Royal%20Haskoning%20PLM%20Report%20Final.pdf>
- May P., and Chatterton J. Establishing the Cost Effectiveness of Property Flood Protection: FD2657, Defra, 2012
- Ogunyoye F., Stevens R. and Underwood S. Temporary and demountable flood protection guide. Environment Agency, 2011 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/290837/scho0711buak-e-e.pdf

Overview of low cost flood repairable approach

Flood resilient reinstatement or resilient repair means reconstructing or reinstating a flood damaged building in such a way that, although floodwater may enter the building, its impact is reduced, i.e. no permanent damage is caused, structural integrity is maintained and drying and cleaning are facilitated quicker when the flood water has receded.

The approach is suitable for any building at risk of flooding even if it the intention is to keep water out because measures may be overtopped or fail. However resilient reinstatement is commonly used as part of a wet proofing or water entry strategy for buildings that can include:

- flood-resilient material and designs;
- sacrificial approaches;
- consideration of hydrostatic pressures/impact loads on structures;
- consideration of how the water will be allowed to enter a property, means of escape for the building occupants and security of building contents during and after a flood;
- drying plan - designs to drain water away after flooding and access to all spaces to allow drying and decontamination;

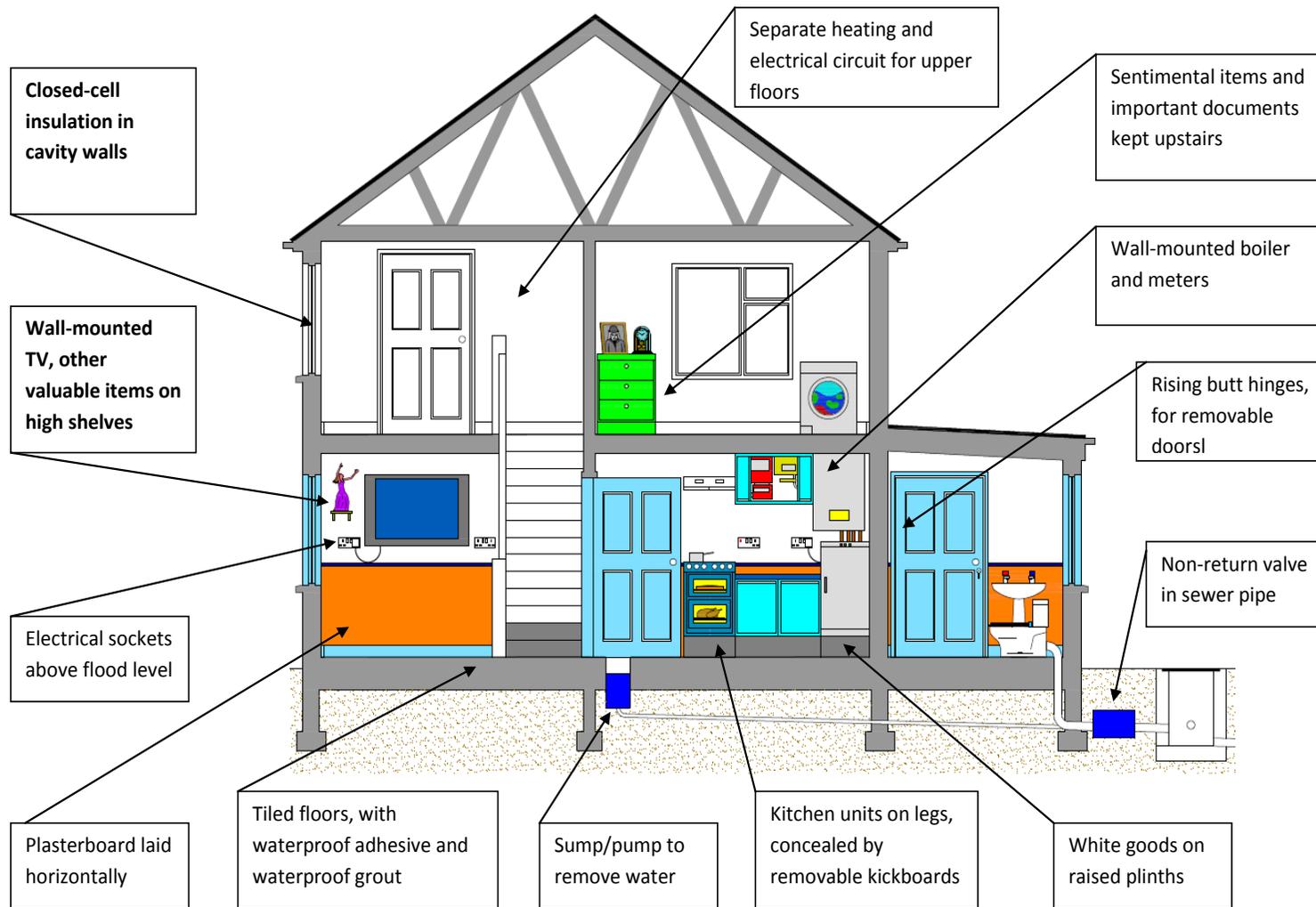
Flood resilience within a building can be achieved in different ways.

- Vulnerable elements (such as electrics) can be raised above the expected flood level or removed (avoidance).
- Exposed elements can be made of, wrapped or coated in flood resistant materials (for example use of plastics) or
- Exposed elements can be made of resilient materials that can accept water without deformation or disintegration and dry quickly afterwards with potential for decontamination (for example cementitious materials).

In all cases the need to evacuate the water quickly is important. For resilient materials the adequate circulation of air around the exposed elements for reasonably rapid drying must be assured.

A range of measures can be used to make a property resilient to damage from floodwater and those used will depend on the nature of the property and the flood risk it faces. The diagram below illustrates some of the approaches and lists of potential approaches are set out in Appendix 1. Where the cost of these is the same as that of a like for like repair, then this cost should be met through the funding released by the insurance company to recover the property, where there is an additional cost, this could potentially be eligible for support through the scheme.

The Flood-Repairable House



Adapted from original image courtesy of the Eastern Solent Coastal Partnership (www.escp.org.uk)

Appendix 1: List of Low Cost Repairable Approaches

MEASURE TYPE	Depth	SPECIFIC interventions
	Key	
	Low = up to 100mm	
	Medium = up to 300mm	
	High = up to 900m	
	Any = up to one storey	
Water compatible walls	Any	Use cement based moisture-resistant plasterboard (eg Aquapanel) or waterproof board (eg Marmox Multiboard)
	Any	Use cellulose-fibre reinforced gypsum for areas with short duration floods (eg Fiberock)
	High	Fix plasterboards horizontally on timber framed walls rather than vertically (aka Sacrificial plaster board/dry-lining)
	High	Lining of walls/membrane /tanking
	High	Ceramic tiled walls with waterproof adhesive and water-resistant grout
	Any	Removable timber (or other) cladding material
	Any	Cement Render/cement sand render/water-resistant cement-based plaster coated on to internal walls then skimmed
	Any	Lime based plaster/ hydraulic lime coating with porous paint on top of plaster, (and salt resistant additive) to allow water vapour to pass out as drying proceeds
	Any	Closed-cell type insulation (to replace mineral wool insulation in cavity walls) (e.g. Sprayed polyurethane foam)
Any	Avoid (non-breathable) vinyl wall-coverings, use breathable paper (affixed with breathable adhesives)	

MEASURE TYPE	Depth	SPECIFIC interventions
Water compatible floors	Any	Use ceramic tiles, loose fitting rugs; removable carpets instead of fitted carpets, parquet or laminate flooring.
	Any	Vinyl/thermoplastic tiles replaced by ceramic tiles (vinyl sheet flooring can be retained)
	Any	Quarry tiles, coated to prevent staining /water absorption
	Any	Cement-rich floor screed
	Any	3mm epoxy resin waterproof floor treatment added to concrete floor screed
	Any	Suspended floors - preservative-treated joists/ floorboards
	Any	Suspended floors (brick and block?) - need to create low point/well in soil or sub-floor, to collect water then pump out
	Any	For suspended floors, if oak floorboards need replacement, then use (cheaper) treated timber
	Any	Treated floorboards, WBP (water and boil proof) plywood, screed or tiles to replace chipboard
	Any	Closed cell board insulation for floors

MEASURE TYPE	Depth	SPECIFIC interventions
Water compatible kitchen fittings	Low	Fit kitchen units with extendable plastic or stainless steel feet or support on raised brick/stonework
	Med	Replace ovens with raised, built under type
	High	Oven/microwave mounted part way up wall (eye-level)
	Any	Specify the least expensive kitchen possible and to expect to replace it (aka Sacrificial approach)
	Any	Free standing removable units (eg pitch pine), then carry upstairs when flood warning received
	High	Limit number of base units; use removable doors with sacrificial bottom carcasses
	Med	Avoid built in appliances and have strong work surfaces that can support appliances during a flood
	Low	Removable kick boards – wrapped around units avoiding end sections that extend to the floor
	Med	Better to have a table and/or high-level ‘breakfast bar’ than a (fixed) island
Any	Avoid kick heaters and use radiators instead.	

**Water compatible
bathroom fittings (ground
floor/ basements)**

Any Waterproof tile adhesive and water-resistant grout for tiled walls

Any Some acrylic baths have integral encapsulated (ie waterproofed) base-boards (cost same as normal acrylic baths)

Any Have a wet room rather than shower tray.

Any Use of an anti-siphon toilet

High No vanity unit around wash-hand basin use wall mounted cupboards/shelves

Any Gravity drained toilets (ground floor) replaced with pumped system

Med Sump and pump system (with alarm in case pump fails)

Building Services

Med Raised electrics sockets, this has a dual purpose, as more accessible for older/less mobile people when raised

High Electric cables drop from first-floor level down to sockets at high level on walls

Any Central heating pumps and controls raised above max expected flood level; and any pipe insulation below expected flood level replaced by closed-cell type

Any Central heating control unit moved upstairs, so radiators serving upper floor(s) can still be used (ground floor underfloor heating only will be affected by flood water)

Any Wall-hung fires >1m above flood level (depending on expected maximum flood depth)

Any Raise meters and fuse boxes >1m above expected flood level, and use plastic housing

Any Boiler mounted above maximum expected flood level

Any Use enamelled radiators, which wipe clean after flood

Any Use demountable radiators

Any Use an enamelled finish wood-burning stove (cast iron rusts after a couple of floods)

Low Raise wood-burner up on robust metal support

Doors/windows/ staircases

Any	Where possible, incoming telephone lines/cable services/ and internal control boxes should be raised above the expected flood levels
High	Through-wall service connections raised >900mm above the ground floor level
Any	Isolated circuits/services e.g. ground floor ring main can be damaged but supply to the upper floors still available; likewise, heating circuits and smaller vulnerable circuits can be isolated.
Any	Place services including electrics in easy to access conduits to allow draining and drying
Any	Anti backflow devices on foul drainage
Any	Anti-backflow valves (NRVs) to sewer pipework AND dishwasher/washing machine pipes.
Any	Water supply pipework insulation can be replaced with flood resistant closed cell material below the expected flooding level.
High	Outside fuel tanks raised on concrete plinth (standard plastic bunds float, pipes then fracture)
Any	Water compatible steps/stairs (partly or fully e.g. resilient staircase of solid timber/steel/concrete
Med	Separate piece of carpeting for bottom-most stairs, removable when flood warning received, then nail back down (but looks like normal fitted stair carpet)
Any	If normal staircase has to be replaced, use open-tread type made of oak. (Half the wood, so cost-neutral at rebuild stage)
Any	Replace internal doors with solid hardwood doors (caution - avoid cheap 'oak-style' doors)
Any	Consider installing cheapest possible doors to be sacrificial.
Any	Removable /light weight internal doors/Replace door hinges with rising butt hinges. These allow doors to be lifted off
Any	Internal hollow cellular-fill type doors - replaced with painted solid timber types (paint these before hanging, with water-resistant paint, to ensure sides and bottom fully covered)
Any	Retain traditional solid wood doors, on rising butt hinges

Any	For wooden windows and external doors - use oil-based or waterproof stains, paint or varnish
Any	If doors, windows, skirting boards, architraves, doorframes and window frames need to be replaced use fibreglass (GRP), PVC-U or similar
High	Hopper style windows with fixed lower panels below the likely flood depth. (caution ensuring adequate low level escape routes)
Any	Replace skirting boards with ceramic tiles
Any	Treat wood skirting, primed on ALL sides
Any	Oak skirting held with removable screws
Any	Use of toughened glass in doors/windows /cabinets (reduce damage from floating debris)
Any	Use non-corrosive door/window hardware fittings (e.g. stainless)
Low	Wall cupboards/built-in-wardrobes - rebuild off floor with plastic legs, concealed by removable plinth
Any	Bookcases formed of fixed brackets but with easily removed shelving

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Any enquiries regarding this publication should be sent to us at

Flood-insurance-questions@defra.gsi.gov.uk

Property Resilience Fund– Local Authority Conference session

Friday 15th January, 13h00 – 16h00
Manchester Metropolitan University (MMU)

Agenda

1. **Introduction** [13h00 – 13h10] Paul O'Hare (MMU)
2. **Resilience Fund Background** [13h10 – 13h20] DCLG
3. **Resilient Repair** [13h20-13h35] Jessica Lamond (UWE)
4. **Property Protection** [13h35 – 13h45] Paul O'Hare
5. **Recording adaptation** [13h45-13h55] Stephen Garvin (BRe)
6. **Resilience Fund Process** [13h55 – 14h15] DCLG / Defra
7. **Insurance claims Process** [14h15 – 14h30] Tom Mason
(Cunningham Lindsey)
8. **Industry Panel Session** [14h30 – 14h55]
Tom Mason, Laura Hughes (ABI), *Daman Cross (Aviva)*
9. **Practical Implementation world café** [14h55 – 15h50]
 - Technical Queries (practical)
 - Technical Queries (insurance issues)
 - Mutual LA support
 - How to encourage uptake
 - Business
10. **Close** [15h50 – 16h00]