Cumbria Flood Resilience Showcase Project
The major flood events of December 2015 saw over 17,000 properties flooded, with the cost of the damage caused estimated to be £1.3bn. Rory Stewart (then Parliamentary Under Secretary of State for Environment and Rural Affairs) set in motion a process which resulted in the ‘Property Flood Resilience Action Plan’ which was published in September 2016.

I head up task group 1 (of 6 taskgroups) of the Property Resilience Action Plan. We were charged with Establishing a practical project in Carlisle. We formed a public-private collaboration with the Environment Agency to promote resilient adaptation amongst the local and wider community.

So, under the project management of Mary Dhonau OBE, we have now created two Showcase properties, to demonstrate a range of innovative and cost-effective measures, which will enable the property owner to recover from a flood quickly and with the minimum of disruption.

This is supported by the ongoing work of the Task Groups to establish standards, data, information, communication and support.

Together we will ensure that people who are (or may be) affected by flooding have all the help and information they need to make their homes and businesses more resilient.

Mark Calvert
Chair Task Group 1
“This is about people and families in their homes, businesses and other organisations, being better equipped in a flood event to reduce the chances of their lives and livelihoods being disrupted; both by stopping flood water entering their properties, and speeding recovery if it does”.

(Dr Peter Bonfield OBE FREng, Chairman of Defra Roundtable)

### Surveying & property flood resilience products
- Masonry protection
- Smart air bricks
- Flood resilient windows
- Flood barriers
- Flood resilient door
- Non-return valve
- Puddler sucker
- Aqua sacks

### Interior work
- Flood resilient building works
- Floor and wall tiles
- Flood resilient kitchen units
- Kitchen work surfaces

### Exterior work
- Masonry protection
- nanoShell
- Epoxy resin paint
- Flood guards
- Non return valve
- Flood barrier

### Interior Resilience
- Testing
- Polyurea wall lining

### Resilient Kitchen
- Flood resilient kitchen units
- Shower room secondary protection
- Non return valves

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**Edenside Barn**

**Botcherby Community Centre**

**PHOTO: RICHARD HEWSON**
Botcherby Community Centre was badly flooded in both 2005 and 2015. When we started the Showcase Project in July 2017, (some 19 months after the floods) most of the centre had been repaired. However, the kitchen was still a shell. We decided to use a selection of Property Flood Resilience products, to try to keep the water out of the Community Centre. We also made the kitchen resilient to future floods by repairing it using flood resilient materials.
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The idea behind this project was to ‘showcase’ as many products as possible, so we have used a variety of different Property Flood Resilience products on all the entrances of the building. In addition to the Storm dry paint, we also did some general maintenance to the pointing, where it was needed.

Before any work could start, it was essential that we took advice from experienced surveyors, who gave of their time for free.

**BRE consultants**

bre.co.uk

**Cunningham Lindsey consultants**

cunninghamlindsey.com/uk

**Trident consultants**

tridentbc.com

**RAB consultants**

rabconsultants.co.uk
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**Flood Resilient windows** donated by the **Flood Company**

*thefloodcompany.co.uk*

Our robust Buffalo Flood Windows have been tried and tested to offer flood protection. They also give added sound insulation and can help save money on heating bills.

**Flood Protection Solutions** puddler sucker

*AET Aqua sacks*

![AET Aqua sacks](image)

Each of our flood defence systems has been rigorously tested to ensure they’re easy and quick to fit and provide total safety to your property from the effects of water ingress. Fitted by **LG Groundworks**

**Flood Technologies** Barrier

*floodtec.co.uk*

**ACE non-return valve**

*aquaticcontrol.co.uk*

The WaStop Non-Return Valve is perfect for protecting against unwanted backflow, odours and rodents. There are no moving or mechanical parts making it virtually maintenance free.

**Flood Defence Door** to play area

*floodsmartsystems.co.uk*

Flood Defence Door KM618179 supplied by Flood Smart Systems Ltd.

**Smart air bricks** donated by **JK Atkinson**

*jtatkinsons.co.uk*

Smart airbrick employs a flood-activated valve that allows unrestricted airflow but blocks the movement of water.

**ACE** non-return valve

*aetflooddefence.com*

Comprising of a heavy-duty jute sack and a cotton liner. Containing a Super-Absorbent Polymer the Aqua-Sac® will be used to help soak up any water that may seep through the flood barriers at the doorways supplied by **AET Flood Defence Ltd.**

**Storm dry Masonry Protection Cream** donated by **Safeguard Europe**

*safeguardeurope.com*

**Flood Protection Solutions** puddler sucker

*AET Aqua sacks*

A puddle pump or puddle sucker is a submersible pump that has the ability to pump down to very low levels. They are ideal for draining water from flat surfaces and dealing with seepage. Puddle Pumps can also be used internally: should flood water start entering your house, they can pump the water back out again.

**Flood Technologies** Barrier

*floodtec.co.uk*

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*aquaticcontrol.co.uk*

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The kitchen has been repaired using two different techniques. The external walls were made flood resilient using materials that could be washed down, sanitized and used straight away. The internal wall was made ‘flood recoverable’. The plaster board was put on horizontally, so it could simply be removed and replaced with new plasterboard. This can be done very quickly. The external walls were also treated with some water-resistant masonry protection cream to prevent the ingress of water.

The first step was to apply Stormdry Masonry Protection Cream, to the external walls up to a height of 1.2m, to waterproof the brickwork and help prevent the ingress of water in the future.

We then applied Uni-Mortar 1 Joint Fill Compound around the perimeter of the floor to wall juncture. This will help waterproof one of the structures weakest points.

Internally we used two replastering systems, the first was the Dryzone Damp Resistant Plaster Flood System, which is a waterproof and salt retardant plaster which owing to its porous structure will dry down very quickly should future flooding occur.

The second system was the Dryzone Drygrip Waterproof Adhesive Express Flood System, which is a plasterboard system using a waterproof and salt retardant adhesive. The advantage of this system is that it can be replaced very quickly with minimal disturbance should future flooding occur.

The walls were then skimmed using Dryzone Hi-Lime Finishing Plaster.

Finally, we applied 2 coats of Drybase Liquid-Applied DPM to the floor. Once applied this product cures to form a waterproof membrane that is flexible and elastic.
With other products and materials kindly donated by:

- **Steelplan Kitchens**
  - steelplankitchens.co.uk

- **Velstone**
  - velstone.com

- **Graham**
  - grahamplumbersmerchant.co.uk

- **CTD**
  - ctdtiles.co.uk

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**Kitchen donated by Steelplan Kitchens**

**Steelplan kitchens** manufacture a strong and durable steel carcase kitchen cabinet system. The cabinet is manufactured in zinc plated polyester powder coated mild steel that is not only water proof and fully sealed from water ingress but is a chip resistant scratch resistant finish. You can choose from a selection of 20 different powder coat colours for the accompanying doors and draws which are also highly flood resilient. The cabinet sits on an adjustable plastic 150mm leg and the plinths are all powder coated aluminium extrusions which are again powder coated in the same colour as the carcase and thus being totally impervious to water.

**Work surfaces donated by Velstone**

Velstone worksurface is solid material manufactured using natural minerals. Available in over 300 colours, Velstone worksurfaces are easy to care & maintain, are impervious to water and built to last.

**Sink donated by Graham**

Graham

grahamplumbersmerchant.co.uk

**STD supplied the wall tiles**

CTD

ceramic tile distributors

ctdtiles.co.uk
Edenside barn was flooded in both the 2005 and 2015 floods and the homeowner had no flood insurance. The plaster had been removed immediately after the flood but no more work had been done since then. We acknowledge that the barn will flood again, although we have used Property Flood Resilience Products to try to keep the water out. The materials we used were scientifically tested by Aquobex and Oxford Brookes University to see which materials would both withhold a flood and dry more quickly afterwards.
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We cleared out existing dilapidated mortar from the stone joints in the existing reveals and re-point these using Delta Koster Repair Mortar Plus mixed with 20% SB Bonding Emulsion. This will increase the water resistance of the stone reveals from the inside (negative side) making it difficult for flood water trying to enter behind the flood barrier defences.

We applied 2 coats of Delta Koster Polysil TG 500 surface hardening/anti salting water repellent primer over the exposed stonework between the flood barrier and door frame. This product was also be applied fully over the stone step/threshold to the edges.

We applied 3 coats of Delta Water Based Epoxy Resin paint over the exposed stonework between the barrier and door frame. As with the Polysil TG5000, this should be also be applied over the stone step/threshold to the outer edges, in order to encapsulate the ‘seal line’.

To achieve continuity fully behind the door frame to min 900mm high and to seal the external RMP/Polysil/Epoxy Resin Paint measures to the internal Polyurea (walls) and resin paint (floor) we used use Delta Koster Joint Sealant for this purpose. It is extremely adhesive, waterproof, flexible and easy to apply by mastic gun.

A new barrier for the garage door was 3.5m wide x 1m high IBS demountable flood barrier, supplied in a single span without the need for a centre post, so deployment is quick and easy. It works on uneven ground so there is no need to re-cast a new concrete threshold, meaning that preparing the site is also easy.
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All the materials in the flood resilient layers used on the internal walls were scientifically tested by Oxford Brookes University at Aquobex Headquarters in Harwell. To maintain the structural integrity of the walls, the interventions used stopped at a metre high.
The Kitchen was designed to be as resilient to flooding as possible. The kitchen drawers can be removed and put higher up during a flood, the oven, fridge and freezer are incorporated into the design which sited them higher up. The washing machine was also put onto a plinth.

**Gyplyner System** metal frame drylining system

![British Gypsum](https://www.british-gypsum.com)

Gyplyner System glued with CT1 which is waterproof. The insulation can be fixed to this and leaves a small gap for ventilation

**Kingspan** closed cell insulation

![Kingspan](https://www.kingspan.com)

For insulation, a key factor in flood resilience is the ability of insulation to recover from the effects of immersion in water and to return to the expected level of thermal performance as soon as possible after the water has subsided. The use of closed cell insulation, such as the Kingspan Insulation range of rigid boards, is recommended as this minimises the impact of flood water.

**Dragon Board** plasterboard finish

![Dragonboard](https://www.dragonboard.co.uk)

Dragon Board is made from magnesium oxide and magnesium chloride, water and a special fibrous material used for strengthening, it is water resistant. Dragon board can be painted onto with a breathable paint for a finished look.

**Gypframe** replacing wooden room partitions

![British Gypsum](https://www.british-gypsum.com)

Gyp Frame replaces the wooded stud partition. It is glued to the floor with CT1 glue and screwed to the ceiling.

**Flood guards** protecting manifold for under floor heating system

![Aquobex](https://www.aquobex.com)

FloodSax - the sandless sandbag solution

FloodKit - toilet stopper

Interior Resilience

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**UKFDA non-return valve**

[link: ukfda.com]

UKFDA Non-return valves are designed to prevent a back flow of water. This has been fitted, as a secondary line of defence on the sink and washing machine.

**FloodKit® Toilet stopper**

[link: floodkit.co.uk]

The FloodKit® Toilet stopper is a patented flood prevention product that will protect against floodwater entering a downstairs bathroom from an overflowing toilet pan in the event of a flood.

The FloodKit® Shower Tube is a tool for protecting downstairs showers or baths from sewage surge during a flood.

**FloodSax** - the sandless sandbag solution

[link: floodsax.co.uk]

The semi-porous inner liner within FloodSax contains a special gelling polymer which absorbs the water to become taut. They are designed so they mould into doorways to keep floodwater out. They will be used inside the doorways to soak up any water that may get through the door barriers.

**Bespoke Flood resilient kitchen** made by Puustelli Miinus based in Finland

[link: puustellimiinus.com]

The Miinus Kitchen is a perfect example of forward thinking. Design, durability and sustainability in one package. The raw materials are carefully chosen to get a good result. The biocomposite frames are totally water resistant and the wooden parts are tolerant. After a flood the kitchen can be sanitised and reused. Any parts that do get damaged, can be easily replaced.
For detailed information watch the videos on our bespoke YouTube channel ‘Cumbria Flood Resilient Showcase Project’

Cumbria Flood Resilience Showcase Project

I would like to say a very big & heartfelt thank you, to all those who have donated products, materials, time and expertise to the Showcase Project. We couldn’t have done it without your support and goodwill!

Mary Dhonau

...and a thank you to all our generous sponsors:

Adler and Allan – but especially to John Leach and Nicky Wall. John Alexander from Aquobex and Martin Dolan from Oxford Brooks University, Rachel Burrows rachelburrows.co.uk for the video diaries and Nigel Long Design for photography and design.