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Cumbria Flood Resilience Showcase Project





"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)

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

Mark Calvert
Chair Task Group 1



Surveying & property flood resilience products 6

- Masonry protection
- Smart air bricks
- Flood resilient windows
- Flood barriers
- Flood resilient door
- Non-return valve
- Puddler sucker
- Aqua sacks



Interior work 8

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



PHOTO: RICHARD HEWSON

Exterior work 12

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



- Insulation
- Water resistant plasterboard
- Stud partitions
- Epoxy resin floors coating
- Porcelain floor tiles
- Doorway plymer liner



Interior Resilience 14

- Testing
- Polyurea wall lining

Resilient Kitchen 14

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

Botcherby Community Centre Project



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.



Surveying and property flood resilience products

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.

Lakeside Flood Solutions
barrier to boiler room door



The system is also extremely user-friendly; it can be easily installed within seconds in the event of a flood alert, and then easily removed and stored away when not required.

Flood Defence Door
to play area



Flood Defence Door KM618179
supplied by **Flood Smart Systems Ltd.**

Smart air bricks donated by **JK Atkinson**



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

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



safeguardeurope.com

Flood Technologies Barrier



floodtec.co.uk

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**



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

Flood Resilient windows donated by the **Flood Company**



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



floodprotectionsolutions.co.uk

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.

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.

AET Aqua sacks



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.**

Kitchen Resilience

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.



Parliamentary Under Secretary of State for the Environment
Thérèse Coffey MP and Emma Howard Boyd, Chair of the Environment Agency

With other products and materials kindly donated by:



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.

RTC builders undertook all the extensive kitchen resilience work



rtcgroup.co.uk

Kitchen donated by **Steelplan Kitchens**



steelplankitchens.co.uk

Steelplan kitchens manufacture a strong and durable steel carcass 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 carcass and thus being totally impervious to water.

Work surfaces donated by **Velstone**



velstone.com

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

Sink donated by **Graham**



grahamplumbersmerchant.co.uk

CTD supplied the wall tiles



ceramic tile distributors

ctdtiles.co.uk

Edenside Barn Project



PHOTO: RICHARD HEWSON

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 withstand a flood and dry more quickly afterwards.



Exterior work

The outside of the barn already had Flood Guards fitted that had been tested to .9 of a metre. The guards have been refurbished for use during the next flood and the garage that had previously not been protected has been fitted with a new flood barrier. Quite a lot of the mortar had degraded, and this was restored to make it more water resistant. This was then further protected by a layer of nanoShell which was sprayed directly onto the walls.

nanoShell donated by Aquobex



FLOOD MANAGEMENT SOLUTIONS

aquobex.com

nanoShell is a transparent breathable waterproof solution used to provide flood protection for properties.

ACE non-return valve



aquaticcontrol.co.uk

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

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.

Materials testing by Oxford Brookes University and Aquobex



FLOOD MANAGEMENT SOLUTIONS

aquobex.com



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 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 **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.

It is a tried and tested standard IBS flood protection system, the likes of which has been used for many years including on some of the largest demountable flood walls in the world.

Repair products donated by **Delta membranes...**



deltamembranes.com

...installed by **Adler and Allan**



adlerandallan.co.uk

Garage door barrier supplied by **IBS Group**



ibsenigneeredproducts.co.uk

A fully designed and engineered **demountable flood barrier** by IBS, perfectly suited for retro-installation in existing (or new) buildings that might have an uneven floor surface. The barrier doesn't require a central support post, meaning deployment is quick and simple. A tried and tested standard IBS product, used extensively around the world.

Polyurea - a fast setting waterproof coating by **Adler and Allan**



adlerandallan.co.uk

Polyurea coatings are touch dry in seconds and ensure serviceability in key assets following flooding incidents. It provides a waterproof barrier, and effective protection for assets from flood water ingress and the damages caused by severe flooding incidents.

Epoxy resin donated by **Delta membranes...**



deltamembranes.com

Once dried water based Epoxy leaves a tough, non toxic, waterproof, easy to clean surface.

...installed by **Peter Cox**



petercox.com

CTD supplied the floor tiles



ctdtiles.co.uk

The floor tiles are porcelain and the adhesive and grout are both waterproof.

Interior Resilience

Gyplyner System metal frame drylining system



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.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.

UKFDA non-return valve



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.

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.



Dragon Board plasterboard finish



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.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



FLOOD MANAGEMENT SOLUTIONS

aquobex.com

FloodKit - toilet stopper



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



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



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

adlerandallan.co.uk



axa.co.uk



barclays.co.uk



gov.uk/government/organisations/environment-agency



floodre.co.uk



...and a special thank you to:

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