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MWH

Urban flooding - creating spaces in places

Why we should design for exceedance

In recent years and specifically over the last few months, flooding where we live and work will have affected many of us. The impact of flooding on people’s health and well-being is devastating.

We design drainage in urban areas to accommodate different size rainfall events. Typically, sewers can accommodate rain with a 1-in-30 chance of occurring in any given year.

Highway drainage is often to a lower standard, 1-in-5 or 1-in-10 chance of occurring in any given year.

Sometimes we add an allowance for climate change. For new development, we should be designing to a higher standard to keep water out of properties.

Planning

We have emergency and contingency planning / procedures to cope with the consequences of extreme events. But what about rainfall that is bigger than the drainage design, which may not be called extreme?



How should we manage the consequences of rainfall that exceeds the capacity of our drainage systems? Should we ignore it, let it happen and deal with the consequences or should we decide to act?

It is unsustainable and unaffordable to build ever bigger drainage for events that have a low probability of occurring.

Building sustainable drainage systems (SuDS) or a grey-green infrastructure on new development, or retrofitting form part of the solution, but will not completely solve our current challenge of managing rainfall that, in the past, we did not design for.

Design

What we can and need to do is to design for exceedance. This approach helps to manage the excess flow that may occasionally occur on the surface within the existing urban environment to reduce its impact on homes and vulnerable assets.

It is about making the most of shared surfaces and spaces so they have more than one function or use.

For example, we can use roads as flood pathways to channel and convey exceedance by strategically increasing the height of kerbs, or profiling the carriageway to direct flow away from vulnerable locations.

Surface changes

Often small changes to the surface create the greatest impact such as changing the slope of a footpath, building or removing a drop kerb.

We can create multi-functional spaces to store water, for example in car parks or open green space.

We can build floodwalls around properties and install property protection measures. We may only use these measures infrequently, but they create resilience within an area. Many can and should be designed to fit aesthetically within the urban area.

Exceedance

We have a big opportunity to manage rainfall and surface water flooding in our urban areas by designing for exceedance more. To do this, we have to make the most of the opportunities we have. Firstly, we need to ensure that when building new developments we check where exceedance may occur, and where it will go. Managing exceedance is a requirement, referred to in the National Planning Policy Framework for England, Sewers for Adoption (7th edition) and the draft national standards for sustainable drainage.

However, despite the requirements, assessing and designing for exceedance is not consistently applied.

There have been missed opportunities to make new developments more resilient.

We need to make best use of drainage models for new development and take the small extra step to include surface topography in the model.

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This way we can simulate rainfall and understand where water will go on the surface, if it will stay within the development boundary, and if small changes to the surface topography can reduce the impacts of flooding.

Unfortunately, we often still see poor practice where arrows are marked on a plan and no further assessment.

Secondly, we have to work together more, as recommended in Sir Michael Pitt’s review of the 2007 flooding.

The Flood & Water Management Act 2010 placed a duty on risk management authorities to work together.

Key players include lead local flood authorities, water and sewerage companies and the Environment Agency.

AMP6

In AMP6, the next planning cycle for water companies may help facilitate more joint working, especially as water companies move from delivering pre-defined outputs to an outcomes approach whilst establishing and working together in partnerships.

Thirdly, we need to work with communities to develop solutions jointly that can help manage known problems.

We are starting to see some great examples

of communities working with risk management authorities to develop multi-stakeholder solutions.

In places, the public really are becoming part of the solution. It is often not easy, and a collaborative and open engagement process is a good way to get people involved.

In this situation its vital that different disciplines work together to create multi-functional infrastructure to provide safe routes for exceedance.

For example, where we are using roads as pathways to channel water, we combine this with permanent or temporary signs warning of flooding.

Designing for exceedance is not the whole answer. It should however be part of the practitioners’ ‘tool box’ to manage the impacts of flooding in a safe way when the existing drainage cannot cope.

Is it not better to manage this water, design for it, engage and provide warning to the public, than let it happen and leave it to chance?

► **Chris Digman** is currently leading a CIRIA / Environment Agency project developing case studies and materials to support others to implement exceedance measures.