Winter resilience: Is our infrastructure fit for purpose to cope with flooding?

Angela Connelly

The APSE Highways, Street Lighting and Winter Maintenance Services Seminar, Blackpool, 10 March 2017

MANCHESTER 1824
The University of Manchester

msa Manchester School of Architecture

- Smart Resilient Technologies, Systems and Tools (SMARTeST)

EU FP7 funded, 2009 – 2012

- Surveying Individual Properties for Flood Resilience

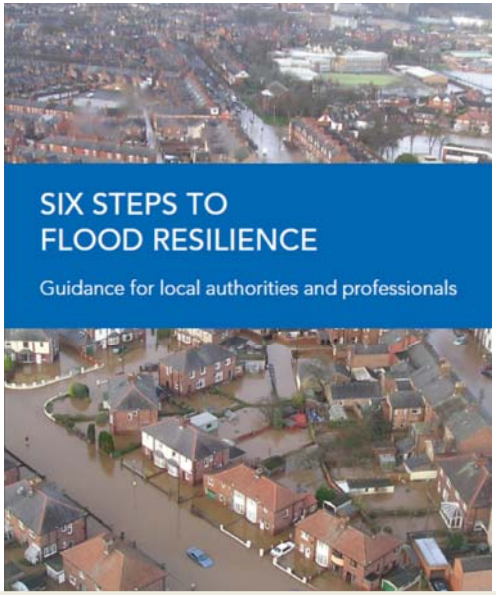
Defra-funded, 2013-14

- Mapping Flood Disadvantage in Scotland,

Scottish Government, 2015

- Climate Resilient Cities and Infrastructure (RESIN)

EU H2020 funded, 2015 - 2018



Step 1: Understand the Risk

Step 2: Planning a Scheme

Step 3: The Property Survey

Step 4: Design and Specification

Step 5: Installation

Step 6: Operation and Maintenance


ED CHICKEN
FREE DELIVERY
01706 33 2009
MS
Metro Rochdale
age UK


GIVE WAY
Unsuitable for heavy goods vehicles
Calder Valley Cycleway
90 yds
66

Winter average rainfall total for UK

330.4mm

Winter 2013/14

545 mm

Winter 2015/16:

529 mm

Source: The Met Office

More winter rainfall has fallen as heavy precipitation during the last thirty years, and there have been increases in winter run-off and high river flows (Watts et al., 2015).

The increase in the number of recent flood events is consistent with a warming climate, but cannot be attributed to climate change.

Year	Estimated properties at risk by source				Total
	Rivers and Sea	Surface Water	Groundwater	Reservoir Failure	
2001					
2004					
2009					
2011					

White, I. (2014) ‘Castles in Sand: The Shifting Sources of Flood Risk and the Implications for Governance’, in Glavovic, B. and Smith, G. (eds) *Adapting to Climate Change: Lessons from Natural Hazards Planning*, Springer, 101-121.

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2011	2,400,000	3,800,000	1,700,000	1,100,000	7,900,000

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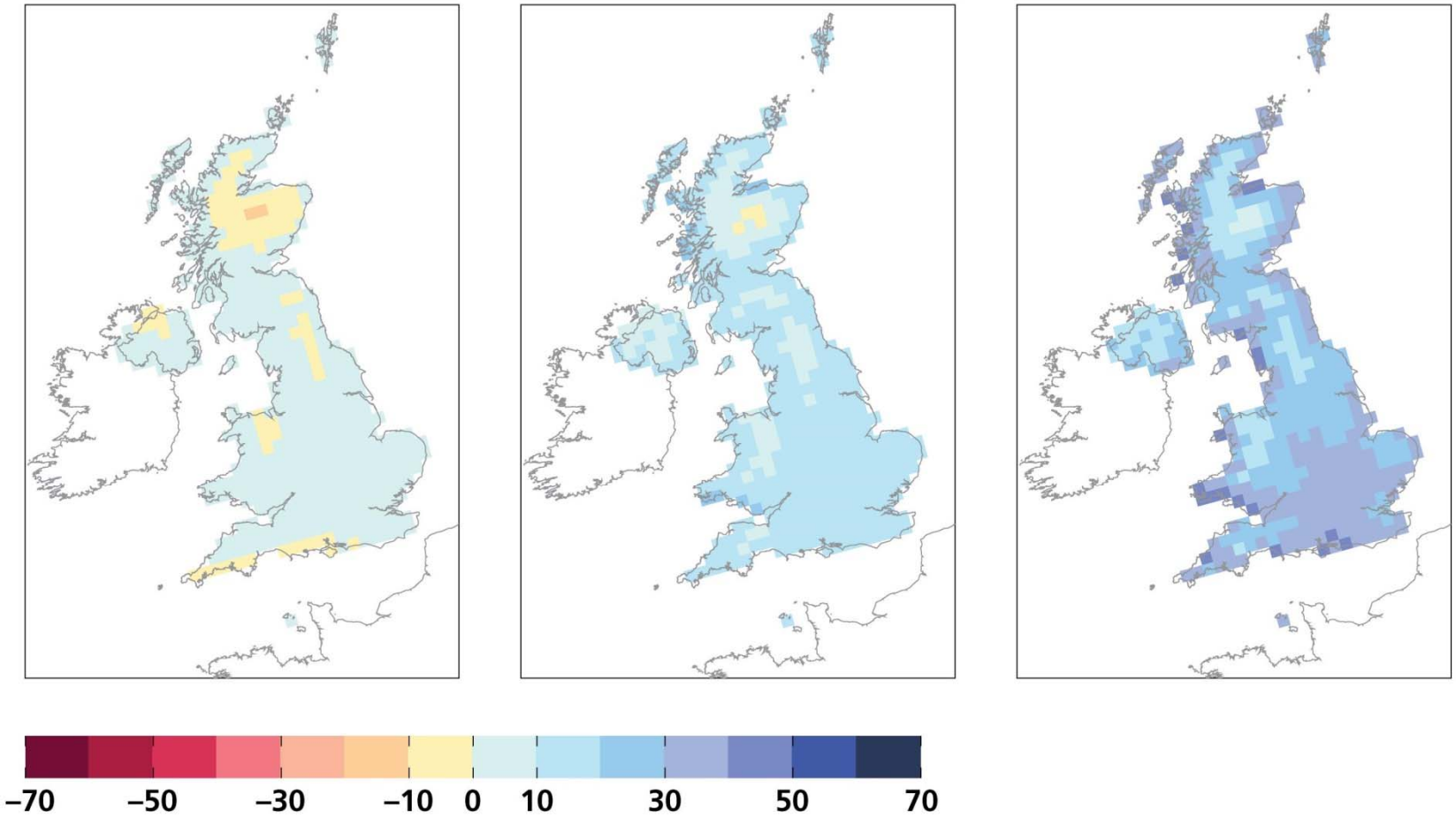
UK CLIMATE PROJECTIONS

10% probability level
Very unlikely to be less than

50% probability level
Central estimate

90% probability level
Very unlikely to be greater than

Winter



Change in winter mean precipitation (%) for the 2050s, Medium emissions scenario

Flooding and coastal change risks to communities, businesses and infrastructure

HIGH MAGNITUDE NOW (high confidence)

HIGH MAGNITUDE IN FUTURE (high confidence)

MORE ACTION NEEDED

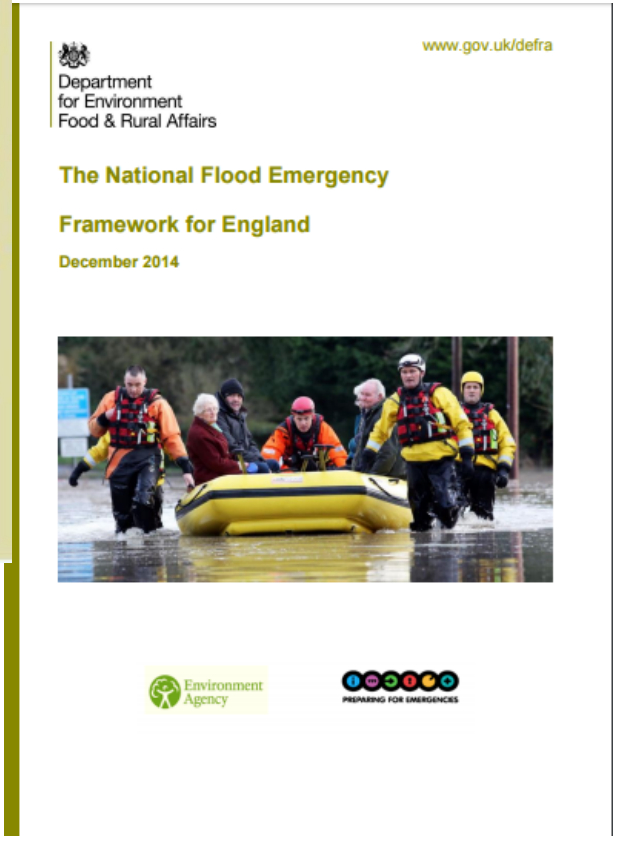
UK Climate Change Risk Assessment, 2017

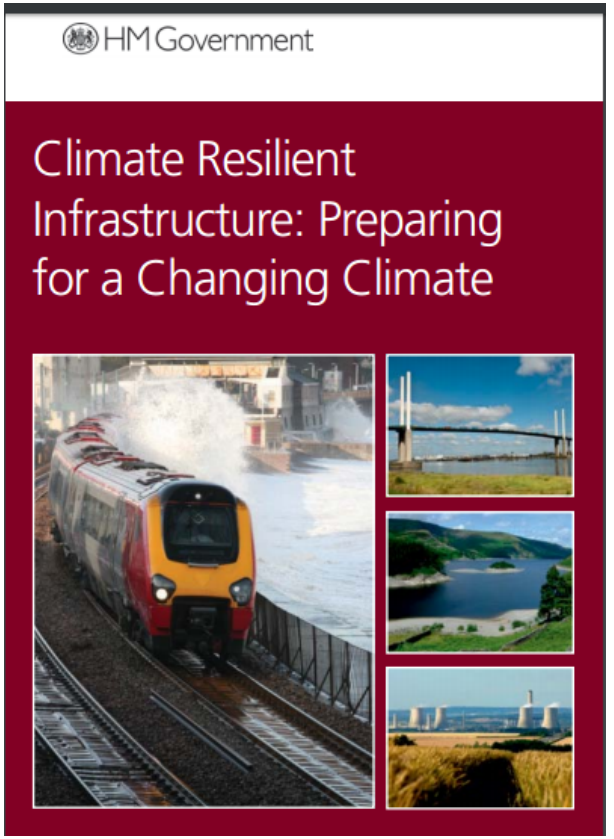
Assets and networks across all infrastructure sectors are already exposed to multiple sources of flooding, and the number of assets exposed could double under expected changes in climate by the 2080s. (Dawson, 2017: 4)

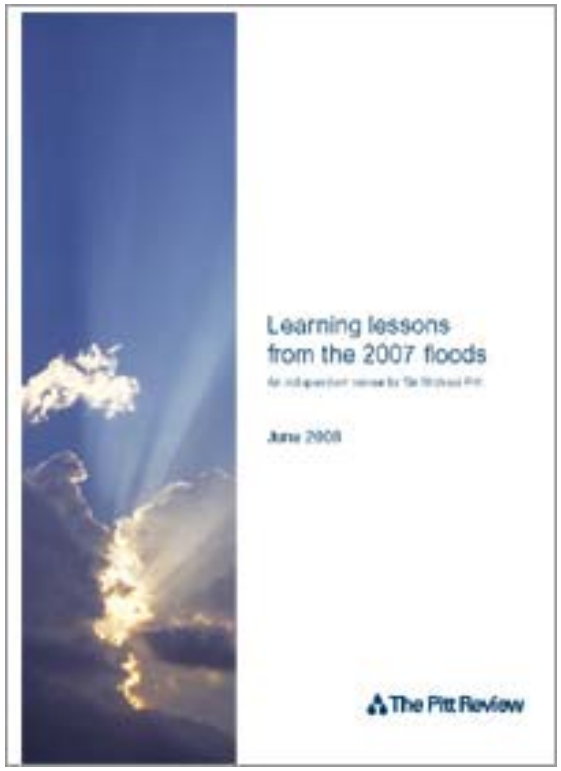
Type of flooding	Greater Manchester's Motorway Network
Flood Zone 3	High
Flood Zone 2	Medium
Surface Water Flooding	High
Surface Water Flooding + Climate Change	High

Likelihood of flood hazards affecting existing elements of GM's motorway network. Source: Carter and Kazmierczak (2013) p. 37

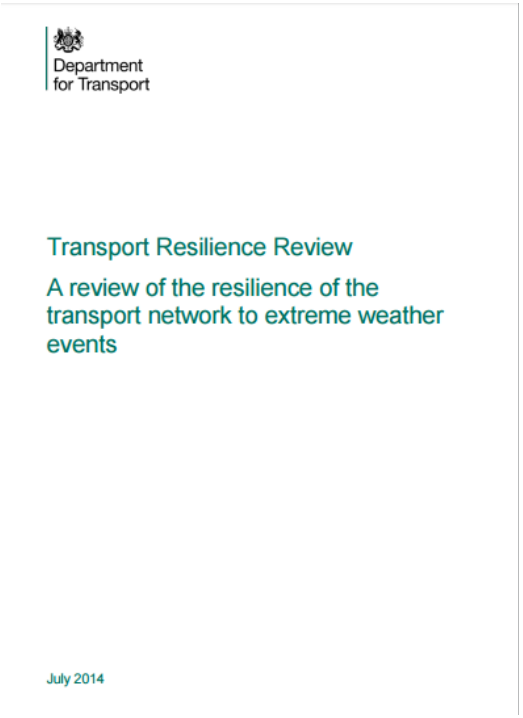

Making space for water
Taking forward a new Government strategy for flood and coastal erosion risk management in England
First Government response to the autumn 2004 Making space for water consultation exercise
March 2005
HM TREASURY
Office of the Deputy Prime Minister
Department for Transport
defra


www.gov.uk/defra
Department for Environment Food & Rural Affairs
The National Flood Emergency Framework for England
December 2014
Environment Agency
PREPARING FOR EMERGENCIES

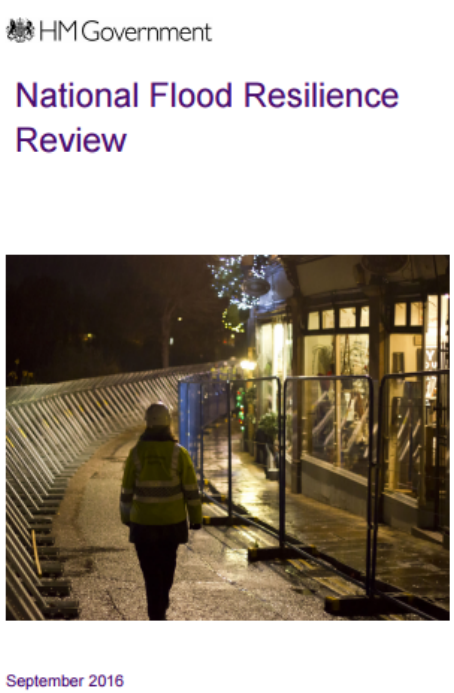

HM Government
Climate Resilient Infrastructure: Preparing for a Changing Climate



2007 Summer Floods

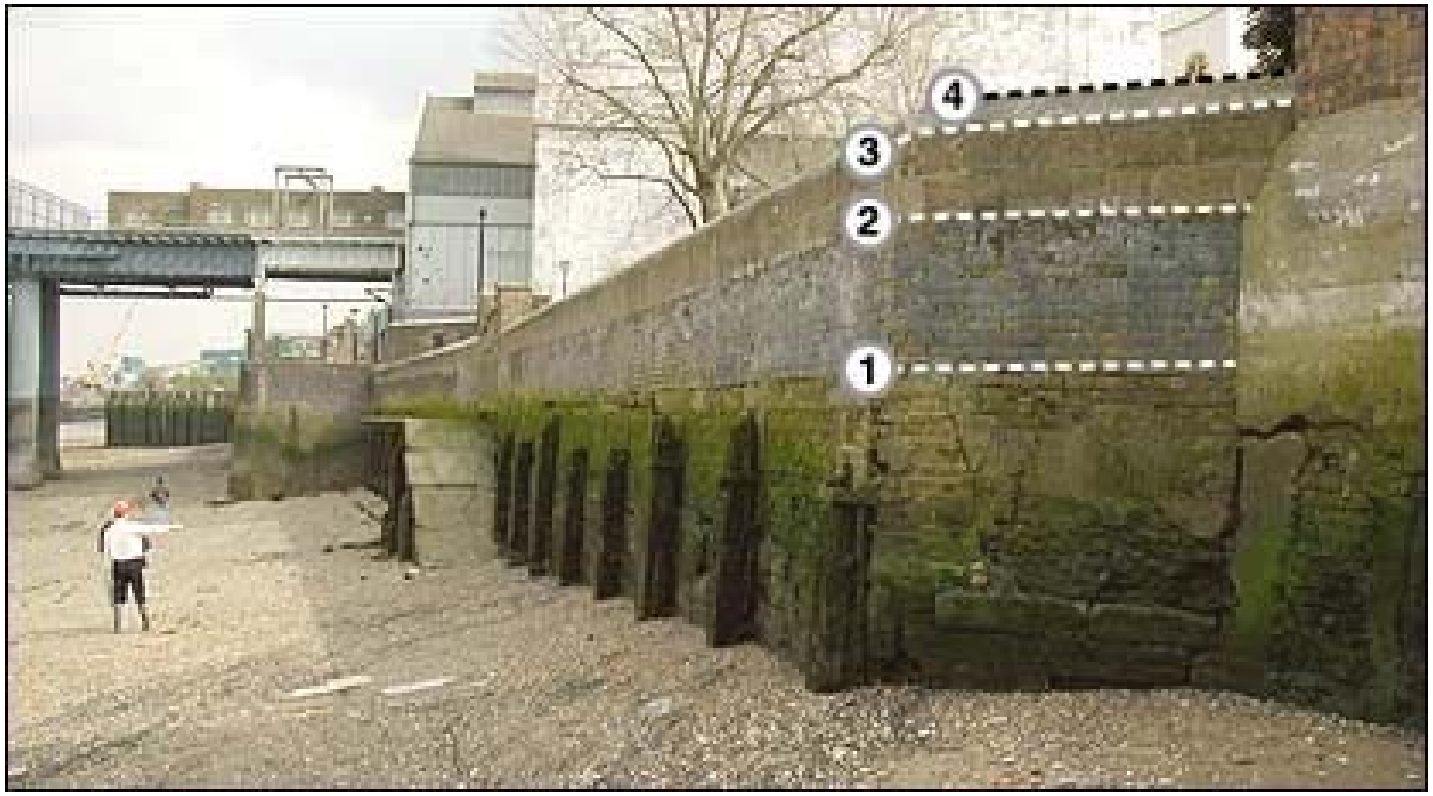


2013/14 Winter Floods



2015/16 Winter Floods

Raising the Flood Defences, Barton Haven, Lincoln
David Wright [CC-BY-SA-2.0)



1.Lowest section of wall constructed as a result of 1879 Flood Act
2.Update to Flood Act before end of 19th Century raised wall further
3.1928 flood and subsequent 1930 Flood Act lifted defences again
4.Interim addition after 1953 flood while Thames Barrier was built
Historic reliance on engineering solutions and bigger defences

Defences behind the Defences

Credit: Mark Williamson Oxford Scientific Getty Images

Advantages

- Composed of demountable and pre-installed elements
- Demountable parts can be stored away when not needed

Disadvantages

- People are needed to install some parts in a flood event
- A suitable warning time is required
- Permanent foundations are needed so can only be installed in a fixed location

Advantages

- Completely removable with no foundations
- No impact on the appearance of the house/neighbourhood
- Mounted only when required and in any location required

Disadvantages

- Requires storage
- A team of people required for installation
- Suitable warning time for installation required
- Not recommended for deep floods or floods with strong waves or fast speeds

Image from Floods Get Surrey!
http://floods.getsurrey.co.uk/index.html

Property Level Protection

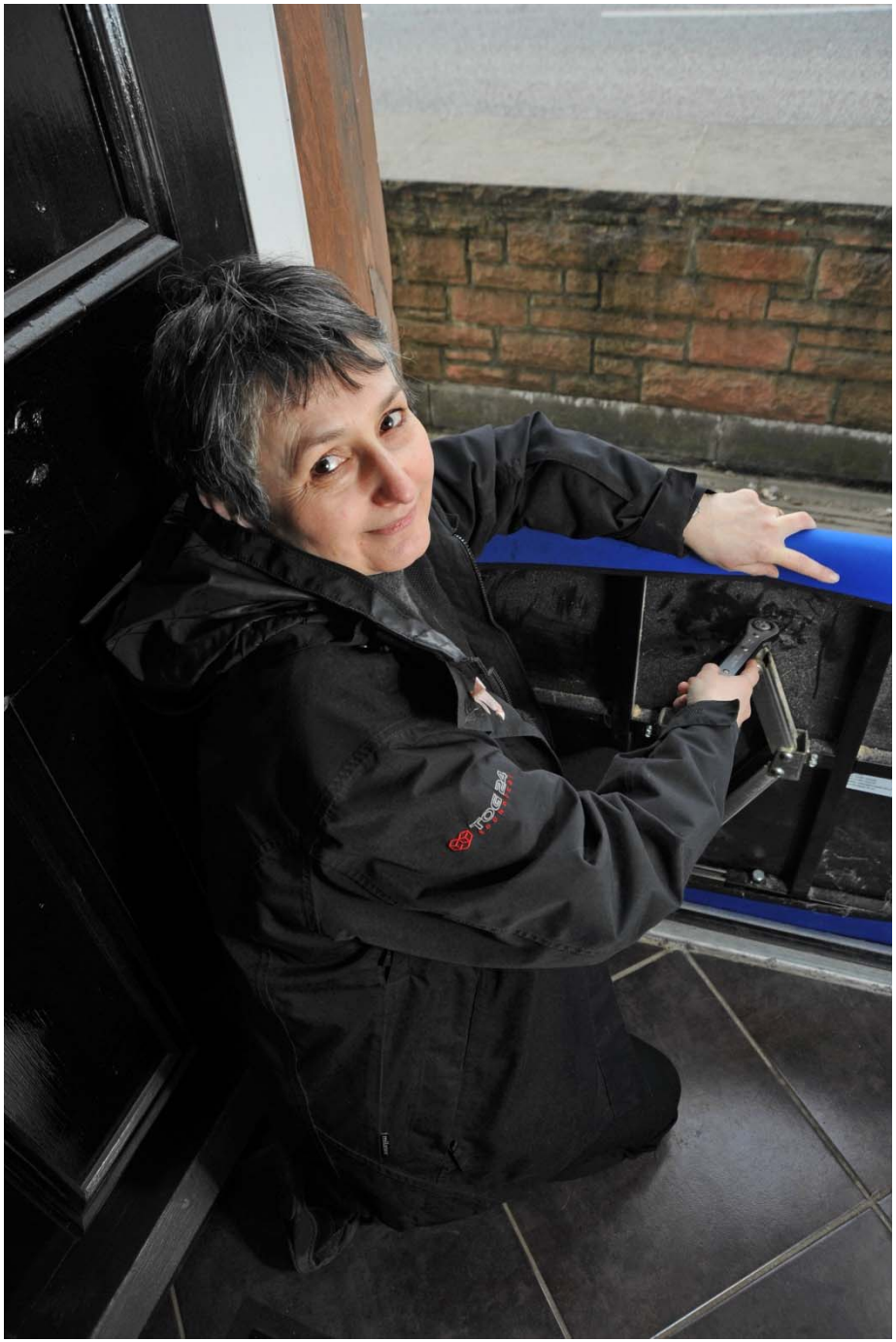
- Includes door guards, airbricks, window guards

Advantages

- Provides property owner with reassurance
- Can slow down the rate of water entry

Disadvantages

- Requires property owner activation
- Requires adequate warning system
- Protects only up to 600mm



An emergent sector that requires support at all ‘road to market’ stages.

Barriers

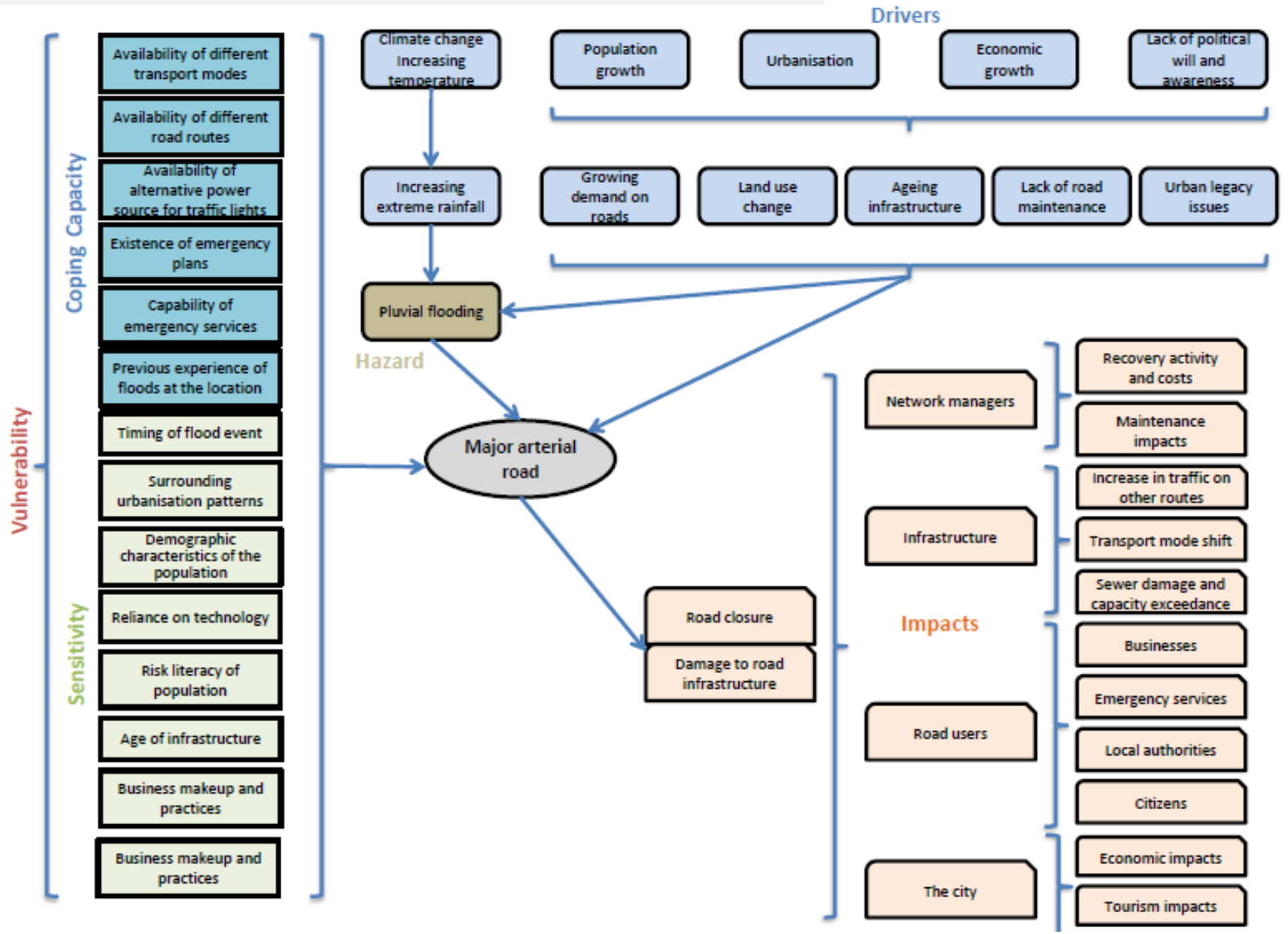
Lack of knowledge on best practice and up-skilling needed in certain sectors, e.g. surveyors, installers, insurers.

Barriers

Technologies need to go hand in hand with social innovation – flood action groups to deploy technologies and to understand when householders need to get out.

Barriers

Impact chain: Pluvial flooding to a major arterial road in Greater Manchester



Thanks!

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