

# INVESTING IN FLOOD RISK MANAGEMENT & DEFENCES

# ABOUT THIS DOCUMENT

- Flood is a major hazard affecting UK households, businesses and communities
- Significant investments have been made to defend properties across the country
- These defences are crucial in averting flooding of thousands of homes and businesses

## HOWEVER...

- The financial benefits of flood defences are not well understood
- This question is addressed for the first time by this analysis
  - Objective: inform discussion around investments in flood defences
  - Scope: probabilistic quantification of the value of flood defences across the UK (*in the form of averted losses from river flooding*)
  - Assumptions: detailed in the Appendix

## KEY RESULTS

- Flood defences reduce **river flood losses by £1.1bn** annually on average.
- This corresponds to a **63% reduction** in inland flood losses nationally.
- More deprived households benefit from **70% of the loss reductions**
- Losses from Storm Desmond would have been **£2.2bn higher without defences.**

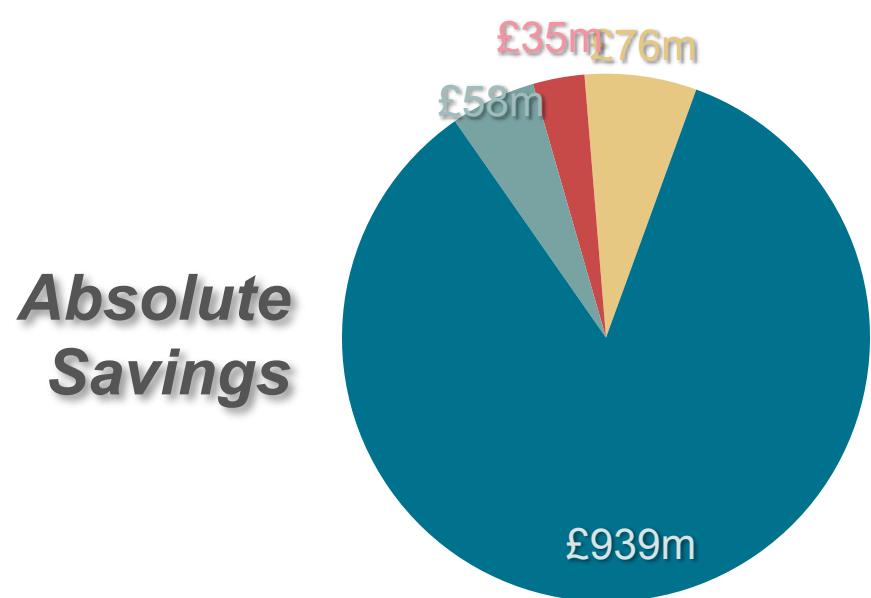
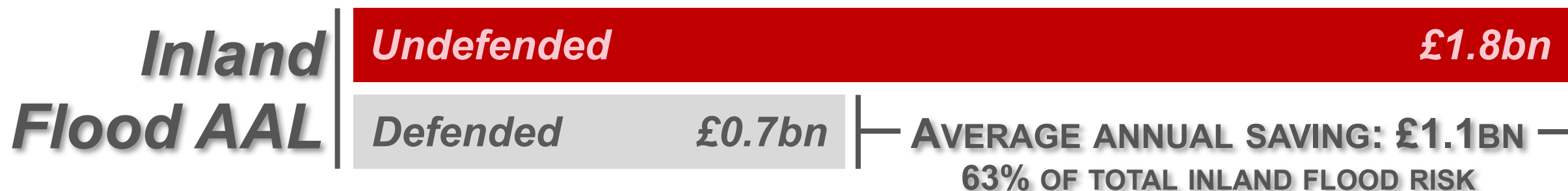
# AVERAGE ANNUAL SAVINGS OF £1.1BN



- Without defences, flooding would...
  - cause £1.1bn in additional losses a year, on average
  - increase annual average cost of inland flooding from 0.7bn to nearly £1.8bn
- The £1.1bn annual savings correspond to 63% reduction of total inland flood losses from surface water and riverine flooding
- Residential properties alone benefit from nearly half of the reductions in losses

*See key analysis assumptions in the Appendix, or contact Flood Re or RMS directly for further details.*

# SIGNIFICANT LOSS REDUCTIONS ACROSS ALL REGIONS

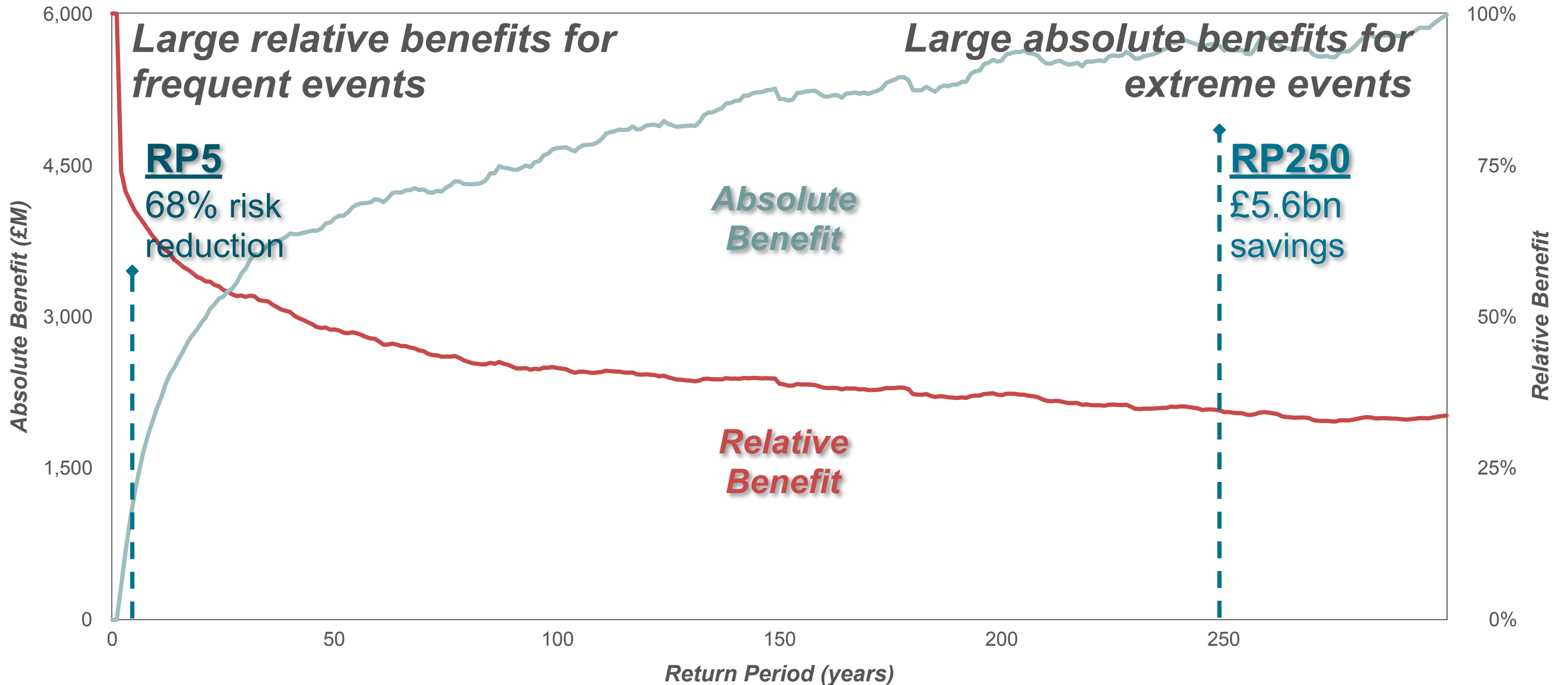


Absolute (£) losses, and therefore savings, are greatest in England, due to the high exposed value in this region

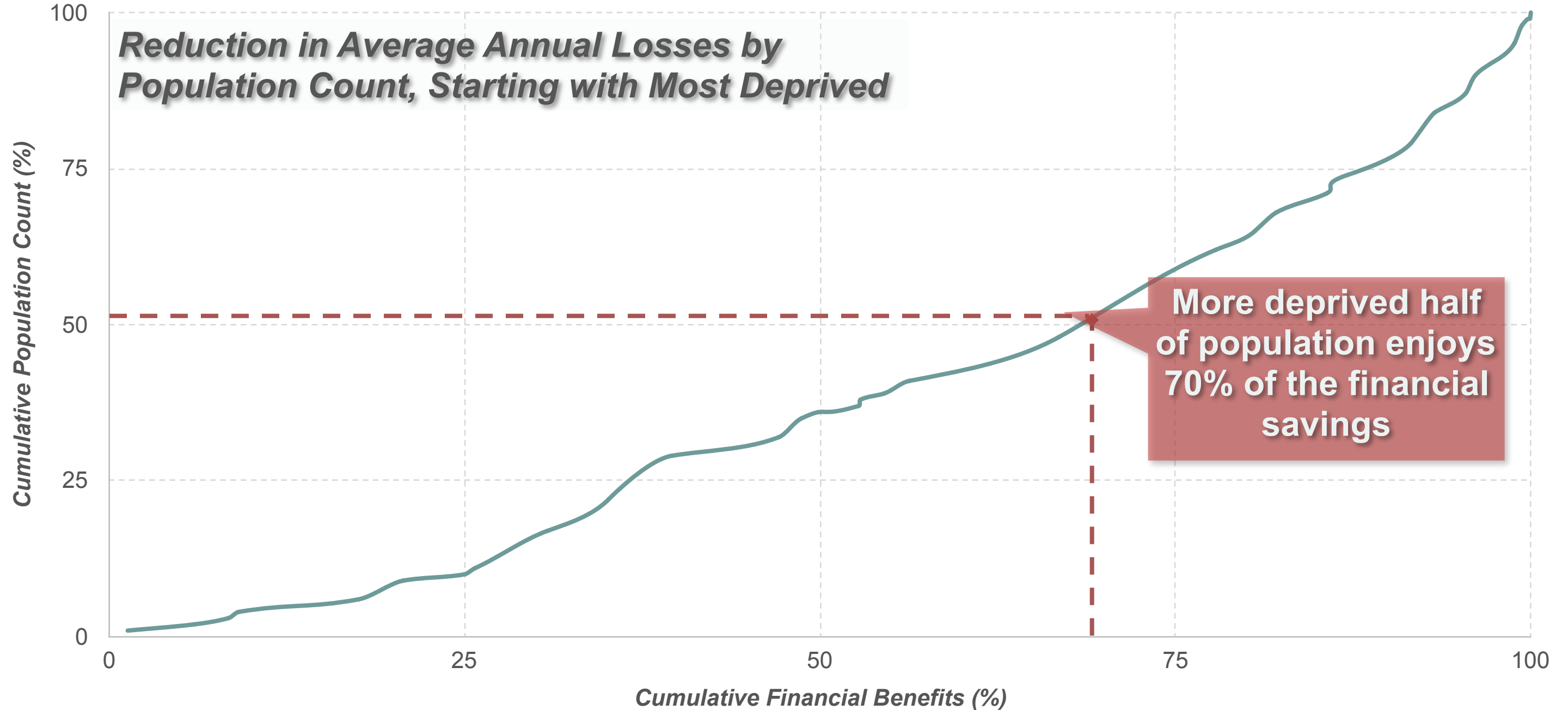


- Relative to their total losses from inland flooding (river & surface water), savings from defences are highest for England and N. Ireland
- Relative savings are lower in Scotland and Wales where losses are driven by surface water flooding, which is not tempered by this analysis

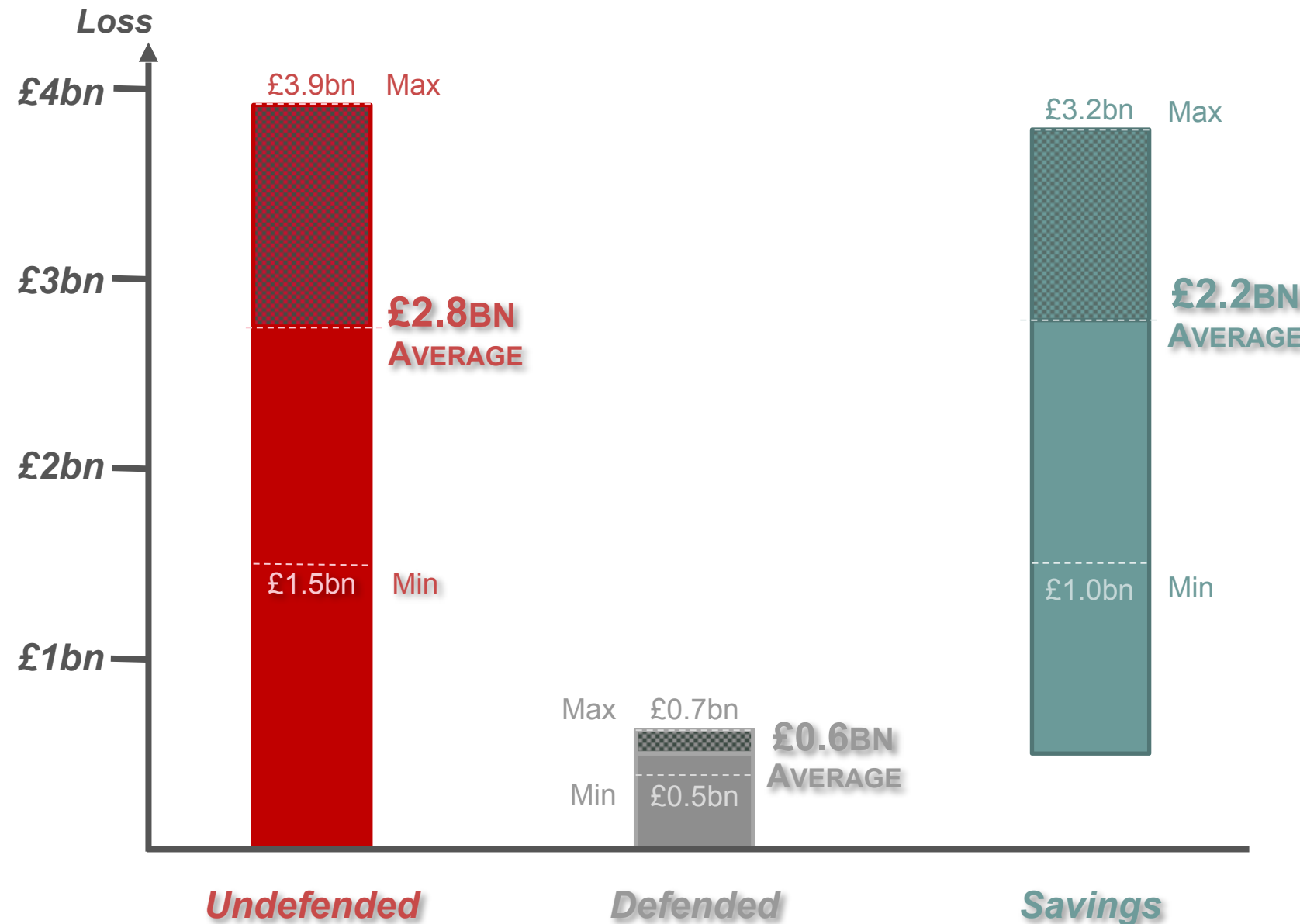
# BENEFITS SPAN VARIOUS FLOODING SCENARIOS



DEPRIVED HOUSEHOLDS BENEFIT MOST



# LOSSES FROM DESMOND WOULD HAVE BEEN £2.2BN HIGHER



- Cumbria experienced significant flooding in 2005 and 2009
- This prompted upgrades to flood defences in the region
- In 2015, severe flooding from Storm Desmond cost Cumbria another £600m
- Without flood defences, however, costs from Desmond would have been £2.8bn, based on average model results
- Homeowners, who benefitted from over 40% of these £2.2bn savings, would alone have lost a further £900m without defences



# APPENDIX

# KEY ANALYSIS ASSUMPTIONS

- Model: The RMS Europe Inland Flood HD Model version 2.1 was used for this analysis.
- Scope of Losses: Modelled losses include losses to residential, commercial, industrial and agricultural buildings and their contents, as well as business interruption losses due to damage to commercial and industrial facilities, and additional expenses (e.g. transport, hotel costs) due to damage to residential homes. Loss figures do not consider damage to agricultural land, infrastructure (e.g. roads) or government buildings.
- Types of Flooding: Results account for both river and surface water sources of inland flooding, but do not include losses due to coastal flooding.
- Defence Assumptions: Assumptions on existing river flood defences use proprietary data developed by RMS, based on data from the Environment Agency and the Scottish Flood Defence Asset Database. River based defences incorporated in the model include walls, levees, embankments and (semi-)tidal defences. River flood defences were subsequently removed from the model in order to quantify the savings achieved by these defences. No changes were made to surface flooding defences incorporated in the model, or to topographical defences, such as sand dunes. These defences provide additional benefits which are not considered in the savings quantified in this analysis.

# ANALYSIS ASSUMPTIONS FOR SPECIFIC RESULTS

- Modelling Losses from Storm Desmond:
  - Analysis results for Storm Desmond are based on 15 stochastic events in the RMS Europe Inland Flood HD Models.
  - The events have been selected to best represent the flooding caused by Desmond based on their event extent, loss cost correlation and loss amount.
  
- Deprivation Analysis:
  - The UK Townsend Deprivation Index was used for this analysis.
  - The index combines measures of unemployment, car and home ownership and overcrowding.
  - Index values were calculated for each postcode sector, based on the 2011 Census Data.<sup>1</sup>

<sup>1</sup> For further details, please visit <https://www.statistics.digitalresources.jisc.ac.uk/dataset/uk-2011-census-postcode-headcounts-and-households-including-deprivation-ranks-individual>

# GLOSSARY

Average Annual Loss (AAL)	The expected value of the modelled loss for a single year – i.e. the long-term average of the loss one can expect to experience within a given year.
Return Period (RP)	The timeframe over which a particular loss threshold can be expected to be exceeded at least once. For example, if a particular loss has a return period of 100 years, it can be expected that this amount will be exceeded once every 100 years, on average.
Standard of Protection (SOP)	The level of protection provided by a defence defined by return period. For example, a SOP of 100 years will protect up to the severity of events which can be expected to occur once every 100 years. Therefore the defence should be breached only once every 100 years, on average.
River Flooding	Flooding caused by rivers overflowing their banks, typically after rainfall across an extended time period.
Surface Flooding	Flooding from surface water, typically after short, extremely heavy rainfall which saturates drainage systems.
Coastal Flooding	Flooding from seawater, typically caused by storm surges during large wind storms and / or extreme tidal conditions.

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