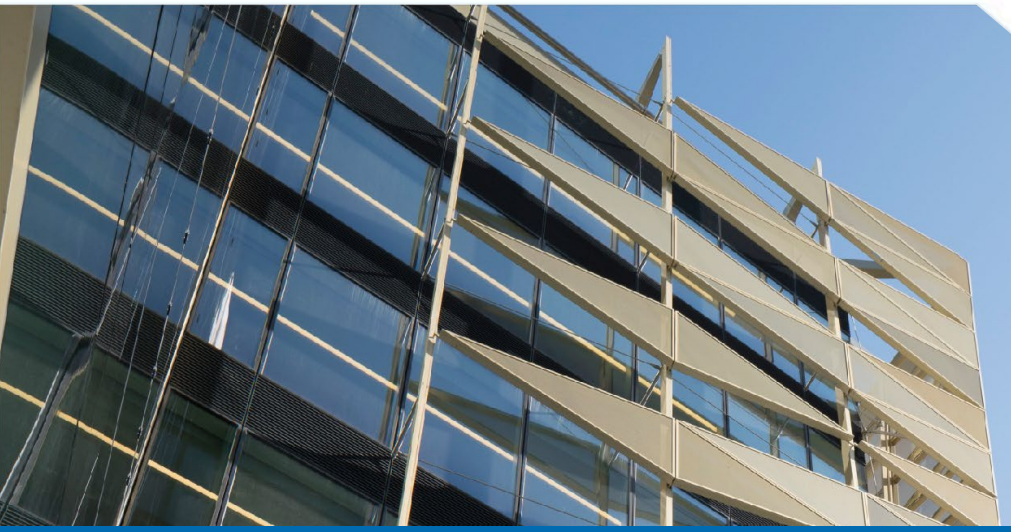
Banc Ceannais na hÉireann
Central Bank of Ireland
Eurosystem



Flood Protection Gap Seminar

17 September 2024

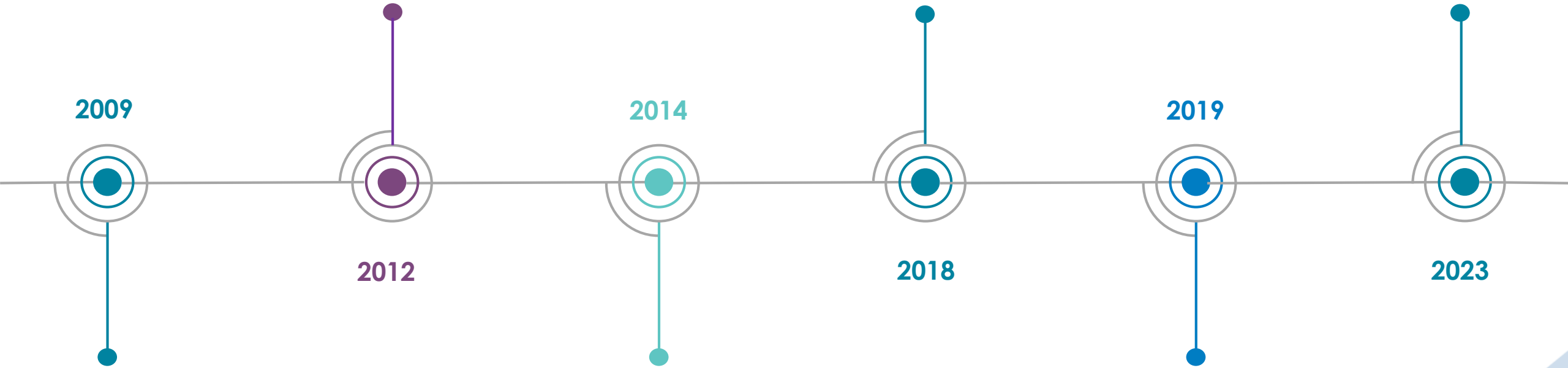
The Flood Protection Gap in Ireland

Agenda

- Background and Headlines
- Flood Risk today
- The Protection Gap today
- How might climate change affect the results?
- Conclusions

Background & Headline Results

Milestones in managing Irish flood risk



Banc Ceannais na hÉireann
Central Bank of Ireland
Eurosystem

Why did we undertake this work?

Climate change driving increased risk of flooding for homes and businesses in Ireland

Aligned to Central Bank mandate

Increased international and European focus on protection gaps

What is a Flood Protection Gap?

- A protection gap is generally considered to be the shortfall between economic losses and insured losses
- This can be caused by lack of access to insurance or a choice not to purchase
- For this project we have quantified the Flood Protection Gap in terms of accessibility of insurance
- If a property seeks flood cover, will it be available?

Photo credit: Irish Examiner

Key Questions in Estimating the Protection Gap

How many properties are vulnerable to flooding in Ireland?

How many of these properties have trouble accessing flood insurance?

What is the potential monetary exposure associated with these uninsurable properties?

How did we approach the analysis?

Roundtable discussion with insurance industry – confirmed broad use of JBA flood scores for underwriting.

JBA risk management THE FLOOD PEOPLE. Gamma LOCATE. ANALYSE. PREDICT

Decision to procure data from flood modelling experts.

Supplemented data analysis with underwriting questionnaire completed by insurers.

Where are we today?

2,020,315

Number of buildings
89%: Residential
11%: Commercial

290,855

Vulnerable to flooding
1/3: High Risk
2/3: Low Risk

68,732

Considered to be protected by defences (OPW and JBA-modelled)

How big is the protection gap today?

1 in 20

Buildings have limited access to Flood Insurance*

€101m

Average Annual Loss modelled for inland flooding**

Concentrated

54% of the gap in Dublin, Cork, Louth, Clare and Kildare

Banc Ceannais na hÉireann
Central Bank of Ireland
Eurosystem

* This means that if all buildings sought to have flood cover today, 1 in 20 would either be refused or would have few providers willing to provide cover and increased underwriting scrutiny. This will not equal the actual number of buildings without cover today, which depends on other factors such as whether or not the person seeks home insurance

** This figure excludes costs arising from coastal flooding which can be very material

How might the protection gap change in future?

Frequency ⇧

Likelihood of extreme events doubles by 2050

+15,631
+€44m

Change to protection gap under High End Scenario by 2050

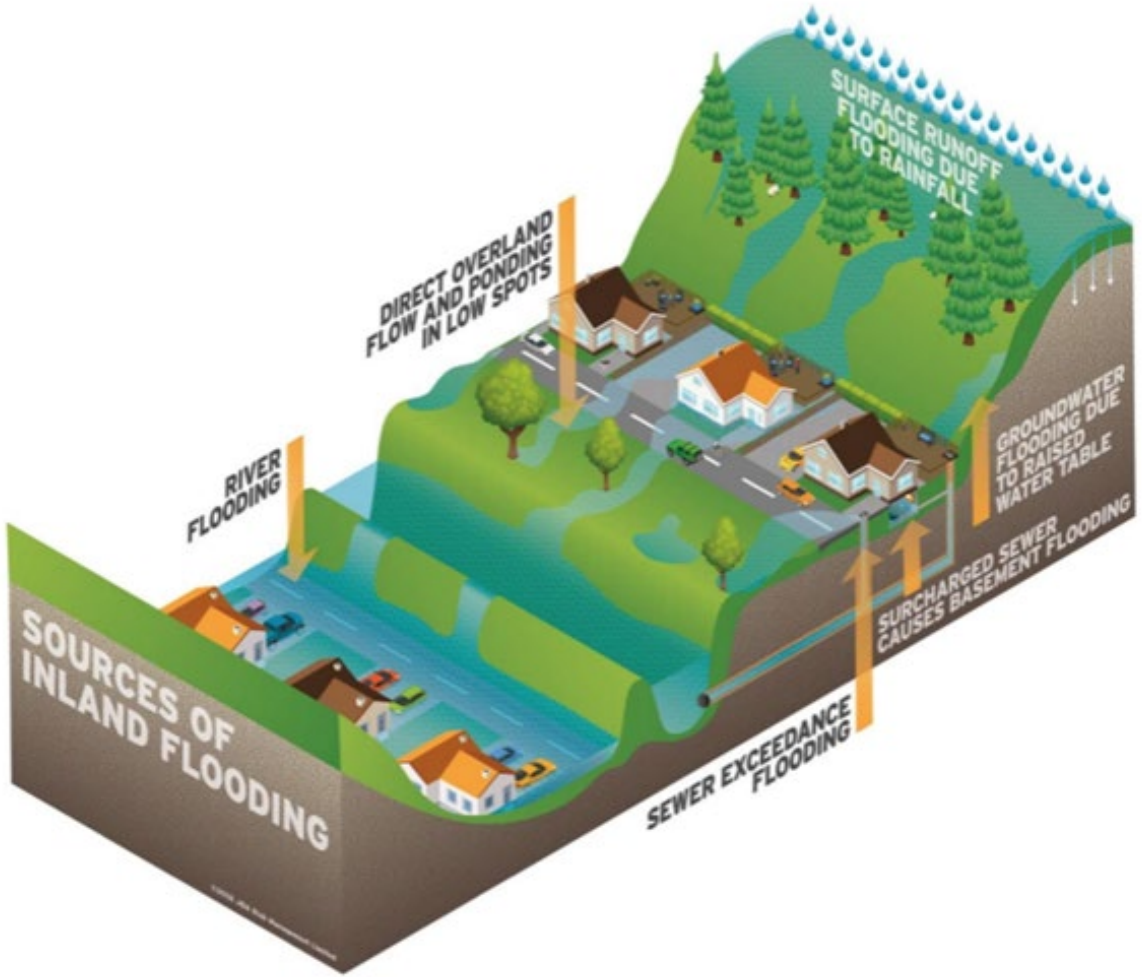
€1.1bn Loss

If an equivalent to Storm Desmond were to hit the east of Ireland

Flood Risk today

Flood Risk in Ireland

- 3 main types: coastal, river (fluvial) and surface water (pluvial)
- Result of complex set of interacting processes: meteorological conditions, terrain, geology & man-made structures.
- Damage depends on event duration, flood depth, water type and property type



What are flood defences?

- Structures, systems and strategies designed to reduce risk and mitigate impact of flooding
- Standard of Protection (SoP) states the return period of flood that the defence is designed to fully mitigate, e.g. 1 in 100 year
- Where the return period of the event exceeds the SoP, the defence will be overtopped

Photo credit: Carey Glass

Flood barrier in Waterford

Defence Types

Fixed defence in Dublin

Demountable defence on River Shannon

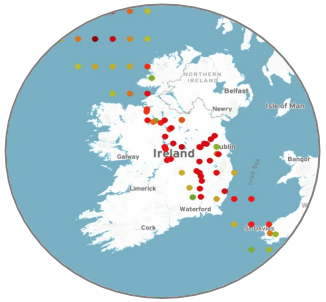
Data Analysis Framework

- How accessible is flood insurance for a building seeking insurance for the first time
- JBA's flood scores used to assess underwriting risk
- Focused on river, surface water and coastal
- Cost of flooding modelled for inland flooding (river and surface water)
- All buildings in the Eircode Address Database (ECAD) included
- Losses associated with individual buildings only

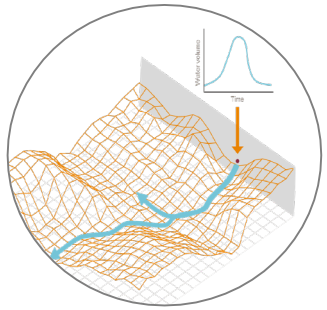
How the JBA Flood Scores work

- Qualitative rating system developed by JBA
- Separate assessment for each flood type
- Scores are calculated by flood type and at a total level
- Scores ranged from 0 to 52

How the JBA Loss Model works

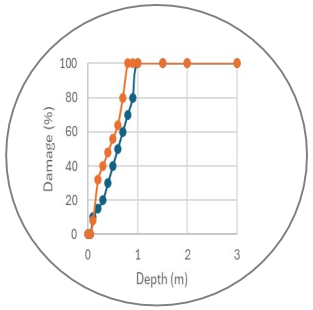


1. Consider a catalogue of plausible flood events over 10,000-year simulation

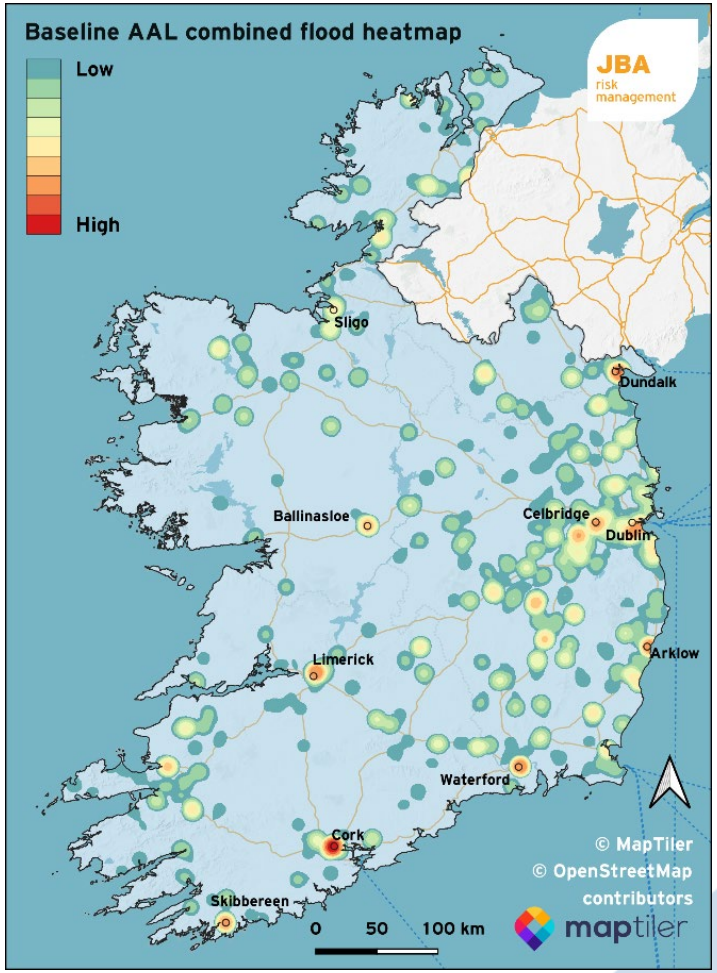


2. Determine extent and depth of flooding per event with mitigating impact of defences

3. For every property consider whether impacted by event



4. Where impacted calculate damage to each property considering type and value



5. Aggregate location level losses and output required metrics

How JBA models flood defences

Flood Defence Level	Description	Considered in Flood Score
JBA 1	JBA has assumed that there are flood relief measures protecting these areas, but the SoP and exact benefitting area is unclear.	No
JBA 2	JBA has sourced either the SoP of the defence or the exact area protected, and modelled the remaining factor themselves.	Yes
JBA 3	Both the SoP of the flood defence and exact area protected have been sourced.	Yes
OPW Fixed	Fixed defences completed by the OPW and covered by the MoU with Insurance Ireland.	Yes
OPW Demountable	Demountable defences completed by the OPW and covered by the MoU with Insurance Ireland.	No

The Protection Gap today

Flood Insurance Acceptance Criteria

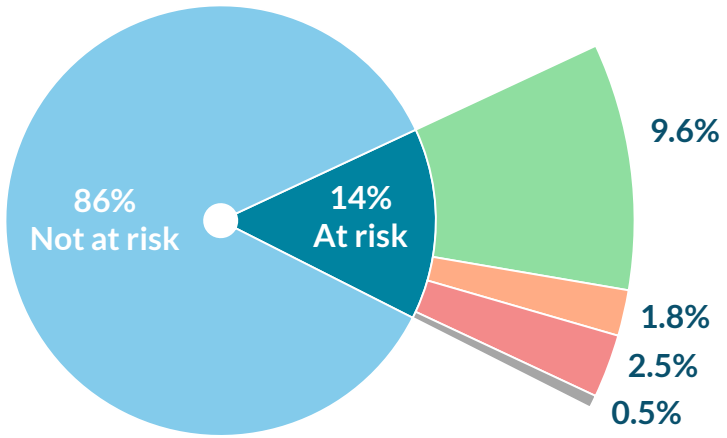
- Variation by company and driven by market conditions
- Table is reflective of current underwriting practices
- **Blue** and **Green** have wide availability of cover
- **Amber** risks subject to additional underwriting and have limited access to affordable flood insurance cover
- **Red** and **Black** risks unable to access flood insurance

Rating	JBA Flood Score	Flood Risk	Insurance Availability
Not at Risk	0	None	Available
Green	1-7	Low	Available
Amber	8-13	Medium	Limited
Red	14-30	High	Unavailable
Black	31-52	Very High	Unavailable

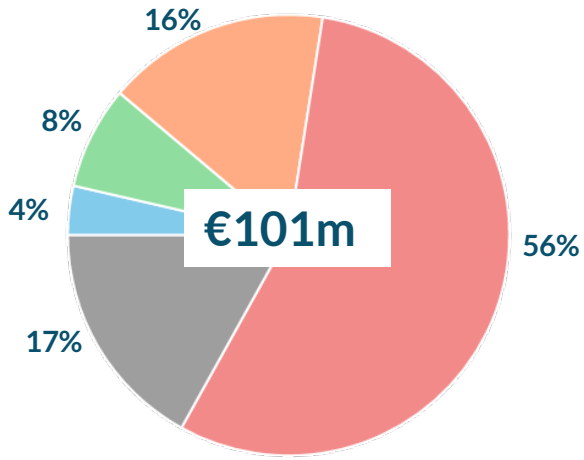
National Flood Protection Gap

How many buildings have limited cover and what is the associated loss today?

Number of Buildings



Average Annual Loss*



# Properties	Total AAL	Per property
1,729,460	€ 3.6 m	€ 2
194,679	€ 7.6 m	€ 39
36,229	€ 16.5 m	€ 456
50,022	€ 56.2 m	€ 1,123
9,925	€ 17.1 m	€ 1,724

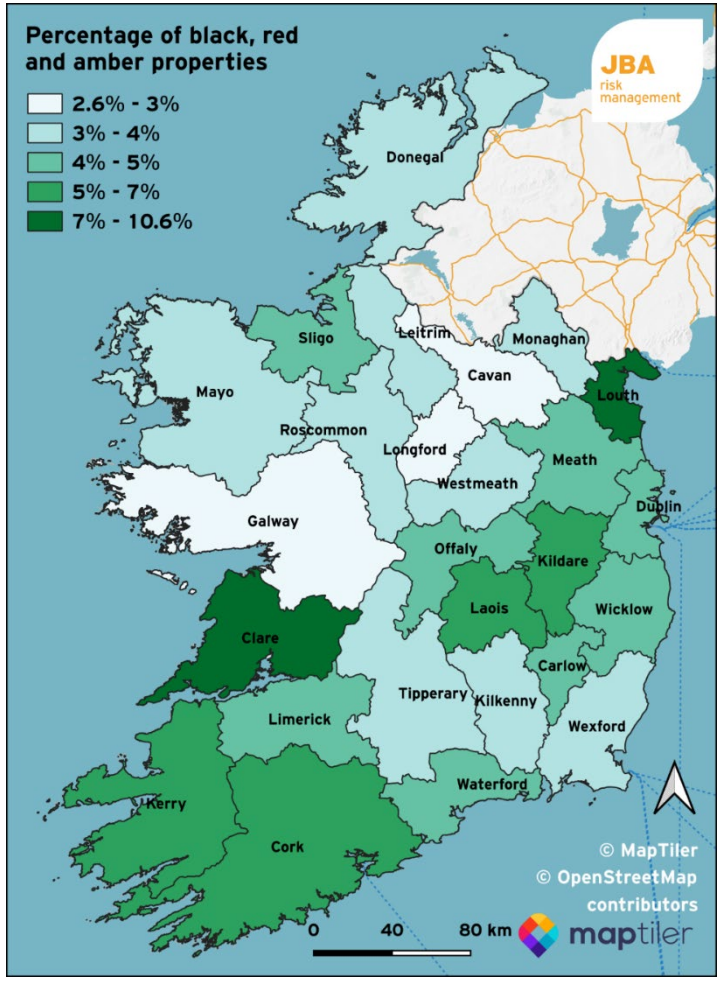
Buildings with Limited Cover: 4.8%

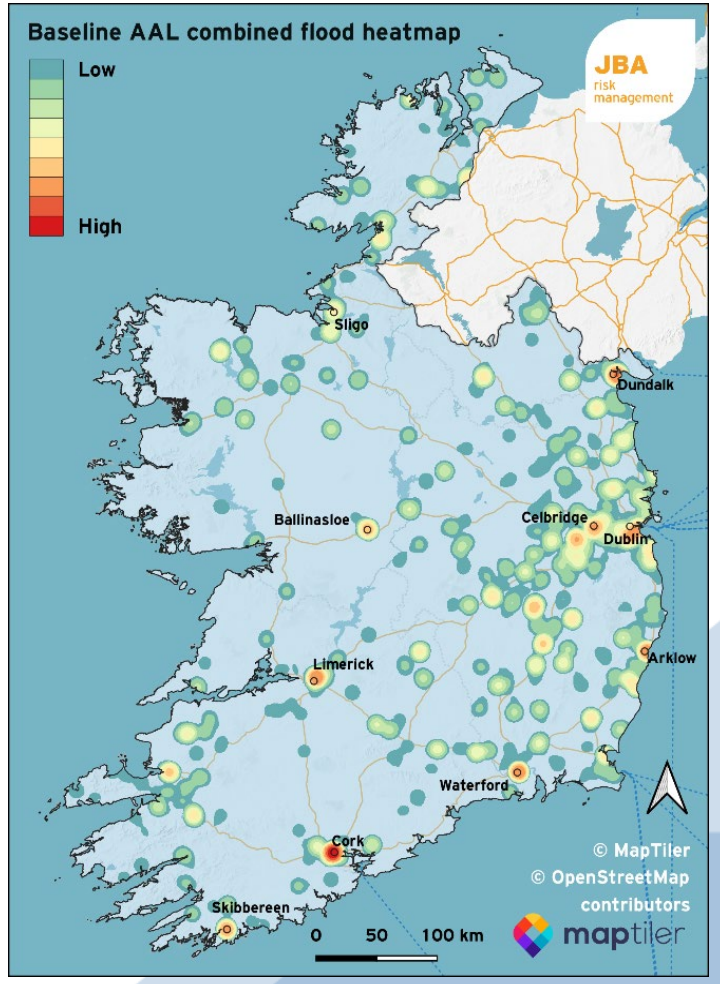
Associated inland flooding AAL: €90m

* Average Annual Loss (AAL) is calculated using the JBA Loss Model. It is the sum of losses from all simulations run by the model, divided by the number of simulations.

County Level Protection Gap

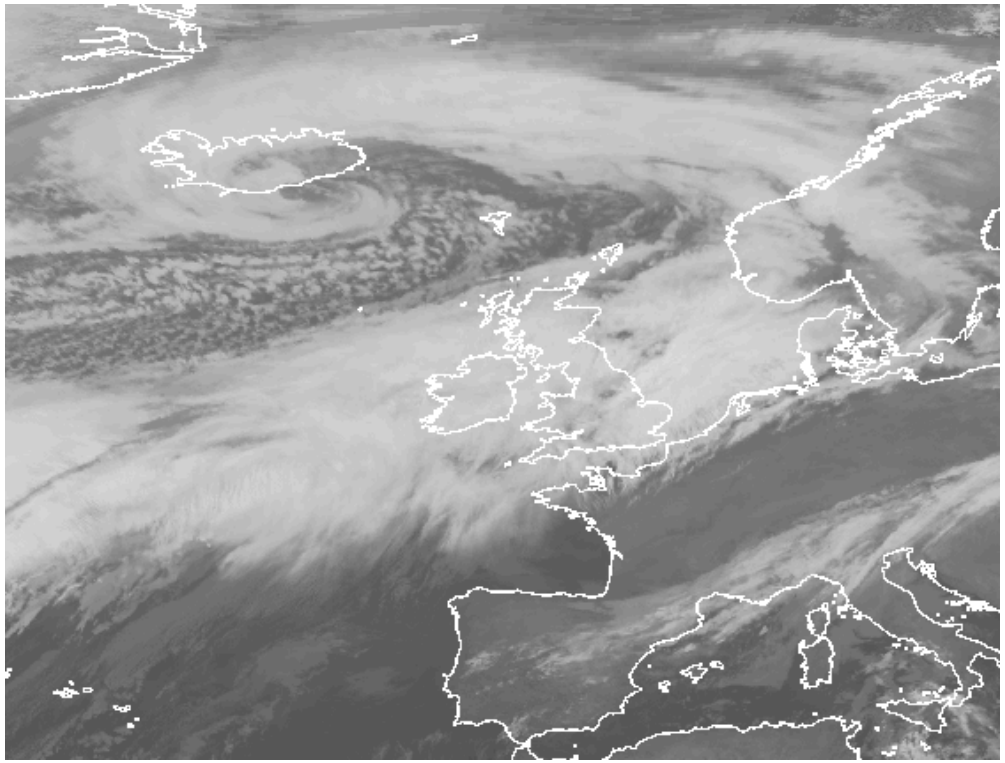
- The Flood Protection Gap is concentrated in particular counties.
- Louth and Clare have the highest proportion of buildings in the **Black**, **Red** & **Amber** categories (limited cover).
- The AAL from inland flooding is concentrated in densely populated counties like Dublin and Cork.





Banc Ceannais na hÉireann
Central Bank of Ireland
Eurosystem

Spotlight: Extreme Losses



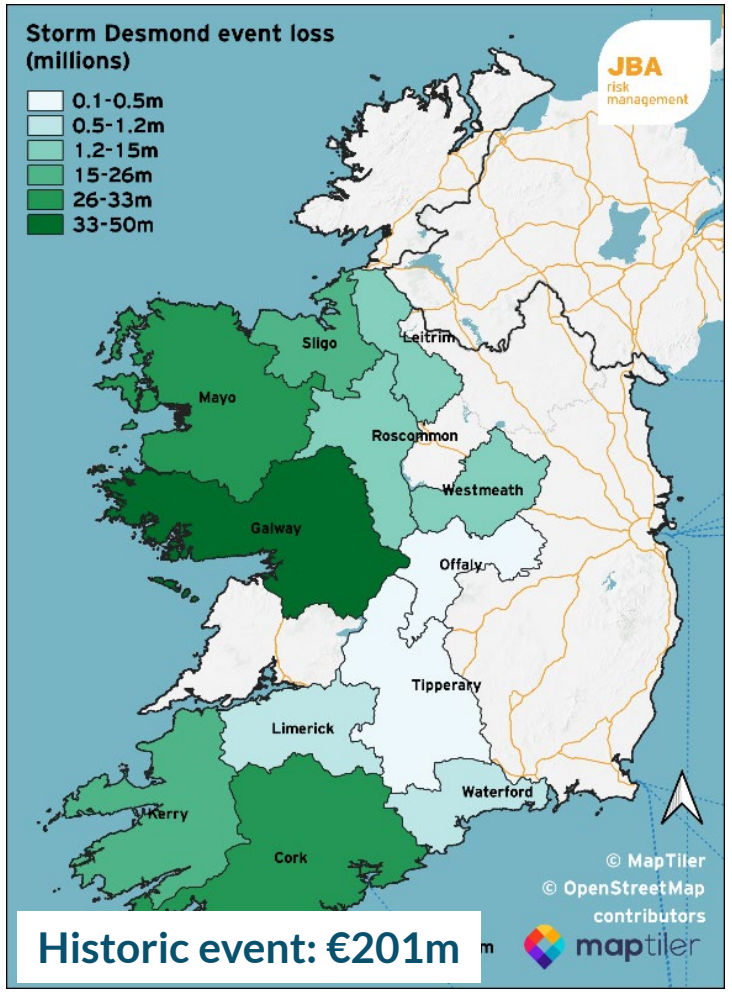
SOURCE: NOAA - http://www.nnvl.noaa.gov/view/#GOES

- **Storm Desmond** hit Ireland in December 2015.
- It caused estimated property losses of **€201m.**
- Losses of this magnitude are modelled to occur with a **1 in 11-year** return period.
- Storm Desmond eventually stalled over Northern England, bringing record rainfalls and major flooding.
- Had Storm Desmond stalled earlier, or taken a more southerly path, the east of Ireland could have had severe flooding.

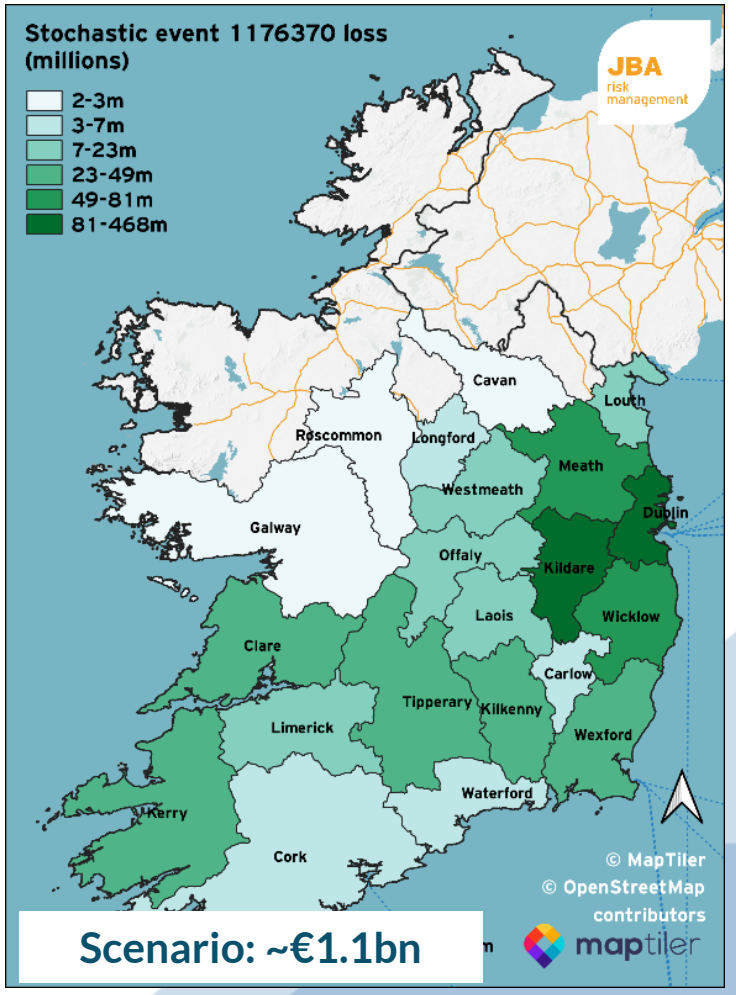
Spotlight: What if Storm Desmond had taken a different path?

Modelled Scenario:

- Storm Desmond takes more southerly path, stalling over Dublin & Cork
- Losses: ~€1.1bn
- An event of this scale will become 33% more frequent by 2050 due to climate change



Historic event: €201m



Scenario: ~€1.1bn

Spotlight: Impact of Demountable Defences

- 4,561 buildings (0.2%) protected
- Concentrated in specific towns
- Not considered by insurers in underwriting decisions
- Significant local impact but minor national impact

Example: Waterford City

- 408 properties protected
- Including these defences in models reduces Waterford City's AAL by 77%, from €2.7m to €640k

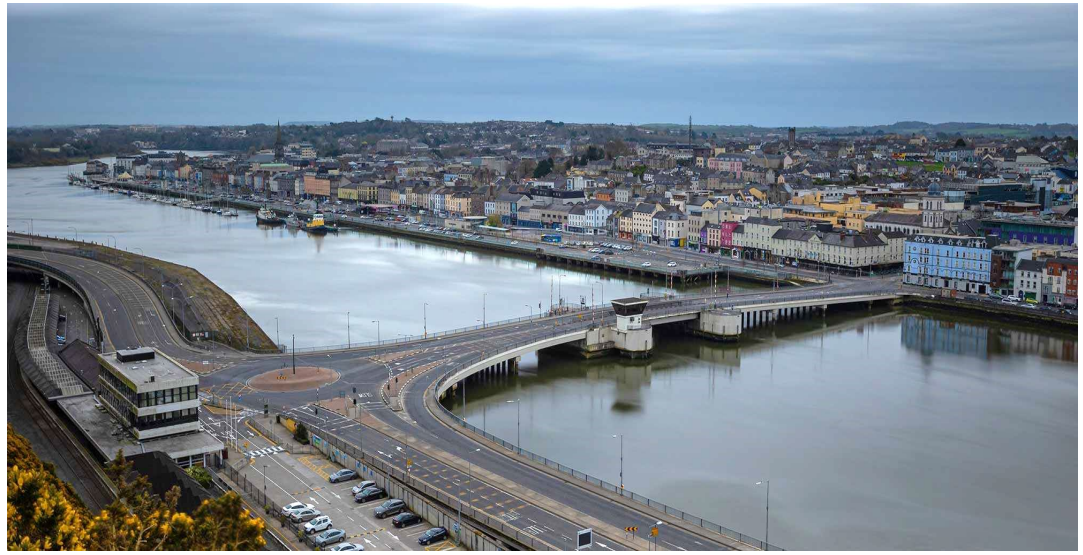


Photo credit: SETU Waterford

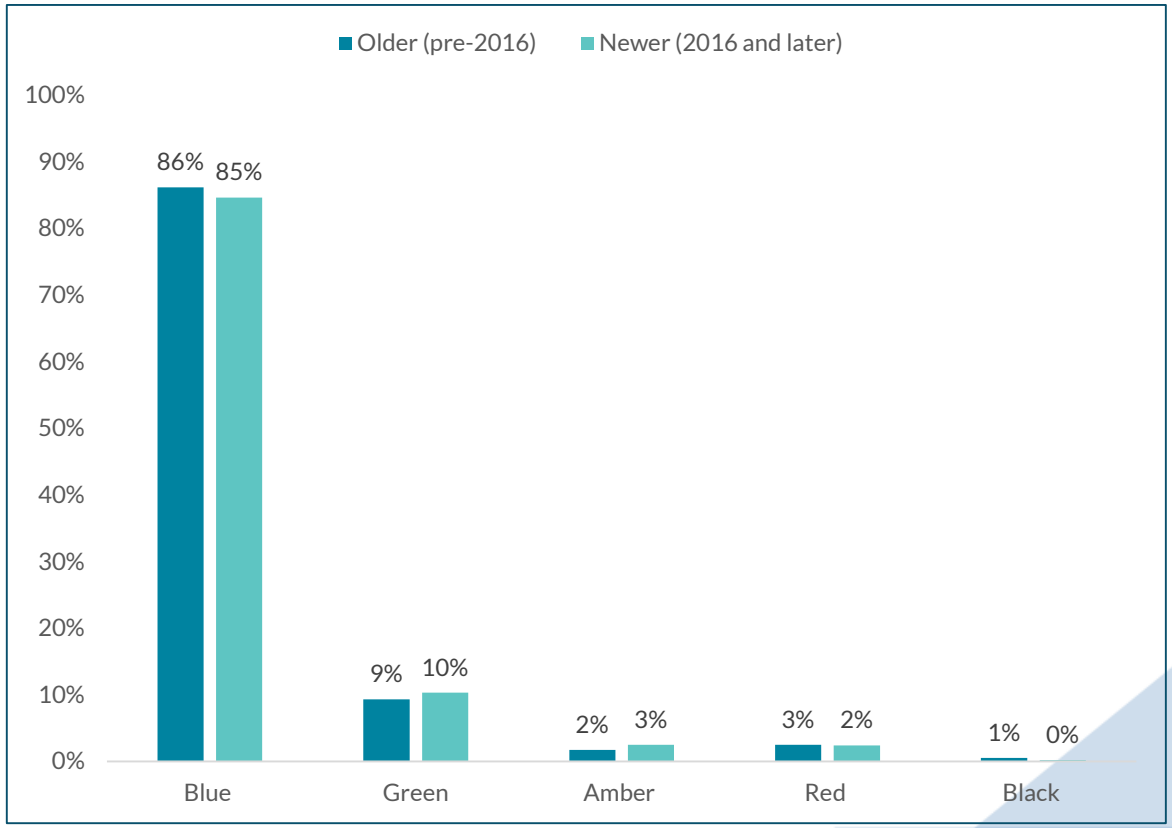
Spotlight: Other flood management strategies

- Flood risk can also be managed using floodplains, dredging and upstream reservoirs
- Limited information available on areas benefitting from protection and standards of protection
- Up to 4% of buildings may benefit from some level of protection
- These are not considered by insurers due to the lack to reliable information

Photo credit: Leinster Express

Spotlight: Are newer buildings more likely to flood?

- Examined flood scores based on the date they were added to ECAD database
- Imperfect measure of construction date
- Two cohorts: 2015 and earlier, 2016 and later
- Slight reduction in high risk, slight increase in low risk
- Many factors involved in planning decisions



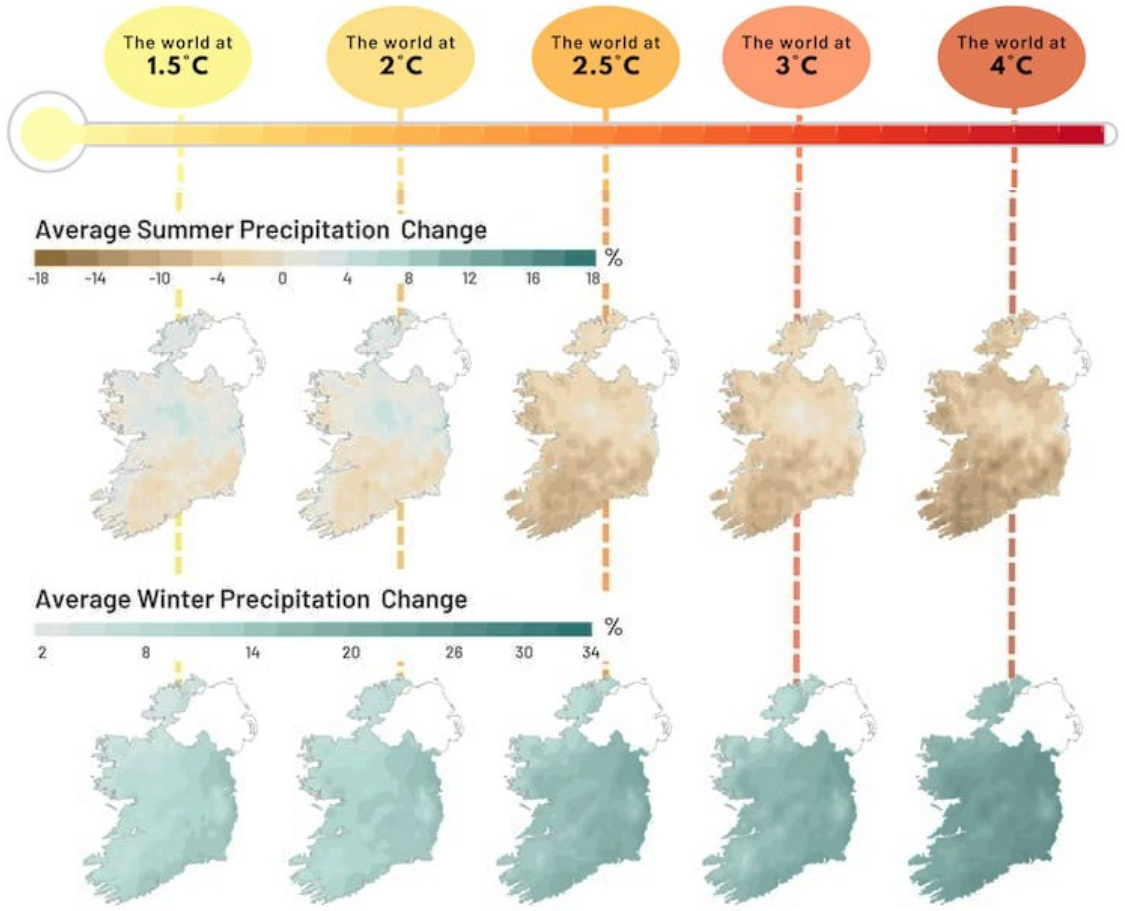
Recap on key findings so far

- 1 in 20 buildings have restricted access to insurance
- Risk is concentrated in particular areas of Ireland
- Defences significantly reduce annual cost of flooding for homes and businesses they protect
- Extreme loss events could have a material impact, particularly in large cities

How might climate change affect the results?

Impact of Climate Change

- 2023 was the wettest and warmest year on record
- Met Éireann's TRANSLATE data shows steady increase in average precipitation
- Extreme storms and floods also become more frequent
- An extreme event costing €2.5bn becomes twice as likely by 2050



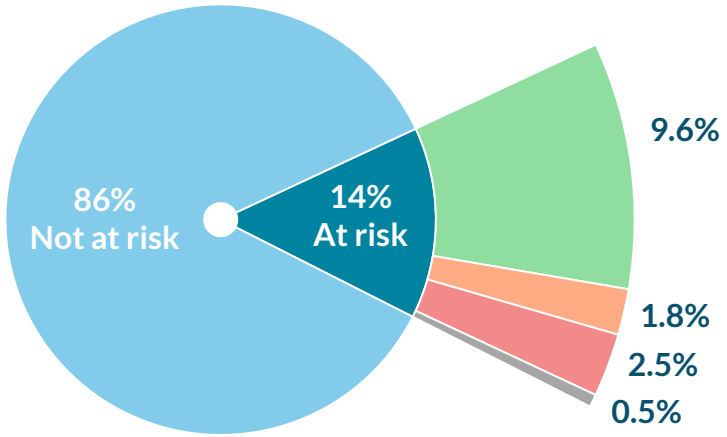
What climate scenarios did we model?

OPW Scenario	Mid-range	High-end
Temperature change by 2050	+ 1.4 degrees	+ 2 degrees
Rainfall increase	+ 20%	+ 30%
Sea level rise	+0.5m	+ 1m
IPCC equivalent	RCP 4.5	RCP 8.5
Description	Moderate carbon cuts – emissions peak in 2040	Business as usual - emissions peak in 2100

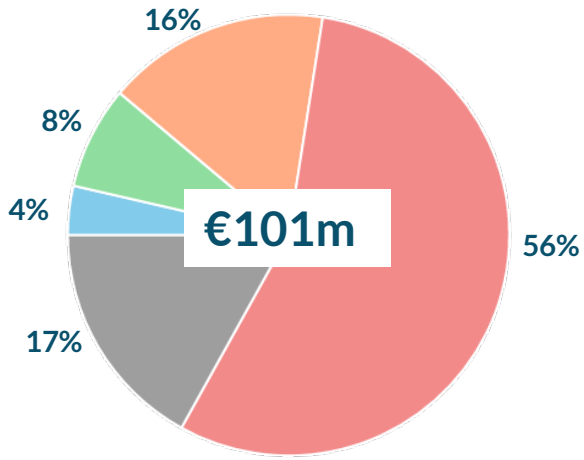
Reminder: National Flood Protection Gap today

How many buildings have limited cover and what is the associated loss today?

Number of Buildings



Average Annual Loss



# Properties	Total AAL	Per property
1,729,460	€ 3.6 m	€ 2
194,679	€ 7.6 m	€ 39
36,229	€ 16.5 m	€ 456
50,022	€ 56.2 m	€ 1,123
9,925	€ 17.1 m	€ 1,724

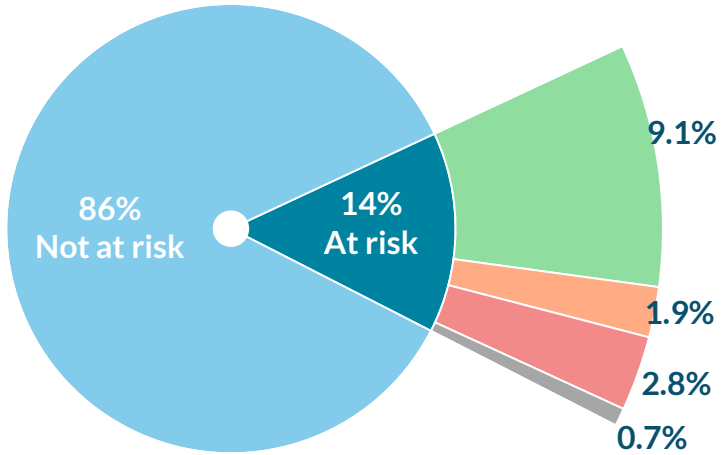
Buildings with Limited Cover: 4.8%

Associated inland flooding AAL: €90m

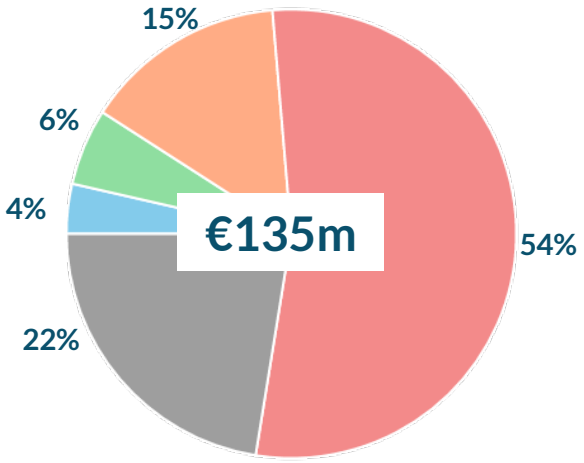
National Flood Protection Gap: Mid-Range Scenario

How many buildings have limited cover and what is the associated loss in the future?

Number of Buildings



Average Annual Loss



# Properties	Total AAL	AAL change from baseline
1,728,093	€ 4.9m	+10%
183,959	€ 7.5 m	
38,123	€ 19.7 m	+37%
56,626	€ 73.0 m	
13,514	€ 30.4 m	

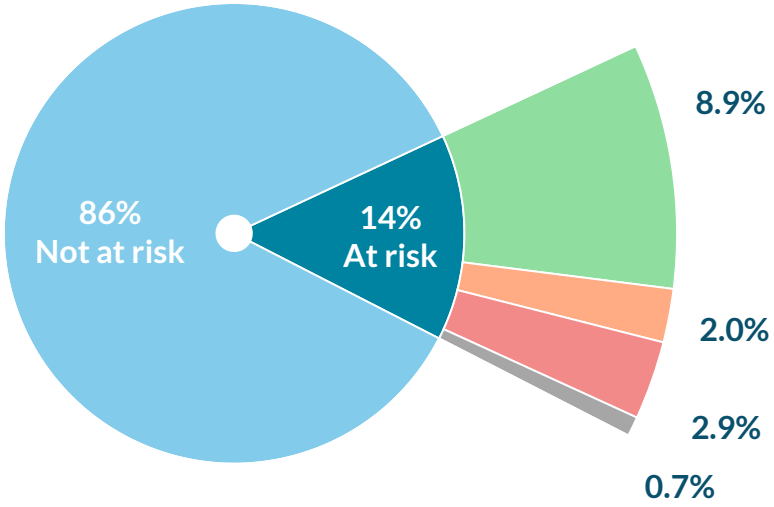
Buildings with Limited Cover: 5.4%

Associated inland flooding AAL: €123m

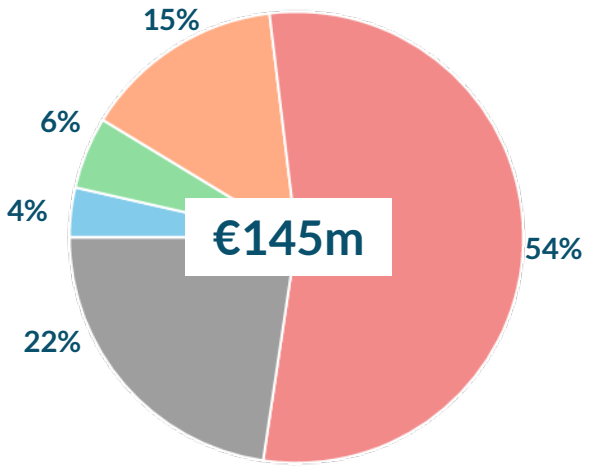
National Flood Protection Gap: High End Scenario

How many buildings have limited cover and what is the associated loss in the future?

Number of Buildings



Average Annual Loss



# Properties	Total AAL	AAL change from baseline
1,727,707	€ 5.2m	+12%
180,801	€ 7.5 m	
39,493	€ 20.9 m	+47%
57,929	€ 78.7 m	
14,385	€ 32.9 m	

Buildings with Limited Cover: 5.6%

Associated inland flooding AAL: €133m

What about Coastal Flooding?

- Firm estimates are not readily available
- Likely to be significant - key infrastructure and over 50% of population located in coastal cities
- Gamma White Paper (2020)* considers a future extreme event: a 100-year coastal flood causing storm surge of 75cm, with a 1m rise in background sea level
- Potential effect on Dublin's coastline shown here
- Cost in the order of €1bn

* https://gamma.ie/wp-content/uploads/2020/10/Gamma-White-Paper-Coastal-Flooding-and-Climate-Change-in-Ireland.pdf

Other challenges posed by climate change

- Reinsurance availability for insurers
- Potential for reduced insurance capacity
- Extreme events could put strain on State aid
- High degree of uncertainty post 2050

Conclusions

Conclusions

- 1 in 20 properties have restricted access to insurance
- Climate change poses a significant risk of widening the gap in future
- Stakeholder collaboration is essential to addressing the issue
- Central Bank will continue to engage with European and international efforts to address protection gaps
- Encourage stakeholders to build on engagement and collaboration to date