



Reserve Bank  
of New Zealand  
Te Pūtea Matua

# Residential mortgage exposure to flooding risks.

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By Rebecca Newman, Ken Nicholls and Jonathon Adams-Kane



Goat Island, New Zealand. Photo: Cuong Nguyen



# Residential mortgage exposure to flooding risks

The financial system is exposed to a range of risks from climate change. Financial institutions have been making progress towards identifying and understanding these risks over the last few years, partially in preparation for disclosure under the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021.

To build on industry efforts, this year we are undertaking risk assessments of New Zealand’s largest banks as part of our stress testing programme, covering banks’ residential mortgage and agricultural exposures. Our long-term aim is to support banks to build their capability to identify climate risks and find solutions to the significant data and modelling challenges involved. In turn, this will lead to more proactive management of climate risk. In the near term, the exercise will provide estimates of exposures to selected climate hazards, which we will use to assess system-wide risk and to design further climate-related stress testing activities.

This Box presents headline results from our assessment of flooding risks to banks’ residential mortgages – both coastal flooding

risks, and river and surface flooding risks. Further detailed analysis of the flooding results will be published in a forthcoming Reserve Bank Bulletin article, and results from the second component focussing on banks’ agricultural exposures will be published in the first half of 2023.

## Coastal flooding: regionally concentrated exposures

For coastal flooding, we asked banks to measure the exposure in their mortgage portfolios, as they currently stand, to flood zones under varying levels of sea level rise. The flood zone is defined as the flooded area in a 1-in-100 year storm tide event.<sup>1</sup>

We asked banks to identify the value of their mortgage exposures that would be affected by permanent sea level rises of 20 centimetres, 50 centimetres and one metre in the most severe case.

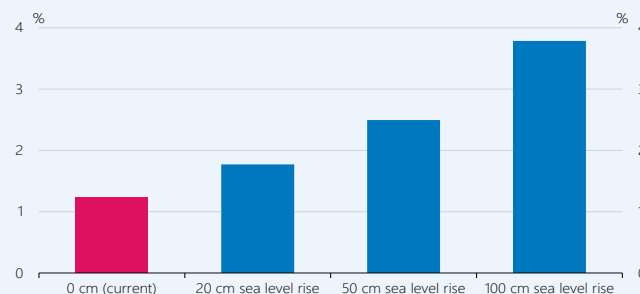
This range of sea level rise is consistent with climate change modelling out from 2040 to 2100.<sup>2</sup>

Across the participating banks, 2.5 percent of mortgaged properties are exposed to the flood zone with 50 centimetres of sea level rise.<sup>3</sup> This increases to 3.8 percent in a more severe climate outcome with one metre of sea level rise (figure C.1).

Coastal flood exposure is concentrated in certain regions. According to bank submissions, for 50 centimetres of sea level rise, the largest share of national lending at risk is in Christchurch (22 percent of the national total) followed by Wellington (14 percent of the national total).

Across regions, there are significant differences in the share of mortgage lending on properties that lie within a coastal flood zone. Hawke’s Bay is particularly at risk, with 15 percent of mortgage lending in the region’s flood zone for 50 centimetres of sea level rise, and almost 20 percent for one metre of sea level rise (figure C.2). At the other extreme, in Auckland just under 1 percent of mortgage lending is within a flood zone for one metre of sea level rise.

**Figure C.1**  
**Residential mortgage lending in a 1-in-100 year storm tide flood zone**  
*(under different sea level rise scenarios)*



Source: Reserve Bank.

1 The storm tide event is the water level with a 1 percent probability of occurrence in a given year, resulting from the combined effect of a storm surge and the tide level.

2 These sea level rises are chosen to represent a range of climate futures. The 20 centimetre and 50 centimetre sea levels are in the range for Representative Concentration Pathways (RCP 2.6, 4.5, 6.0, and 8.5) between 2040 and 2060; while 100 centimetres is a ‘worst case’ which is included to account for factors including uncertainty bands and localised differences in sea level (e.g. from vertical land movement). See *IPCC (2013), Annex II: Climate System Scenario Tables. In: Climate Change 2013 The Physical Science Basis* for more information on RCPs. Due to data constraints, the actual levels modelled by banks differ slightly from the prescribed levels.

3 This is similar to [NIWA](#) estimates that 2.9 percent of New Zealand’s population and 3.5 percent of buildings (including non-residential) are in the flood zone at 50cm of sea level rise.

## River and surface water flooding risk in Auckland

Data and capability for assessing river and surface water flood risk at the national level are not as advanced as that for coastal flooding. Working within these constraints, we asked banks to assess their exposure to river and surface water flood risk in the Auckland region. Banks use data from the Auckland Council that maps a 1-in-100 year flood zone aligned with a scenario where current climate policies remain unchanged to 2050.<sup>4</sup> Although there was some variability in banks' approaches, most results include a conservative assumption that a property is at risk if any part of the land area touches the flood zone.

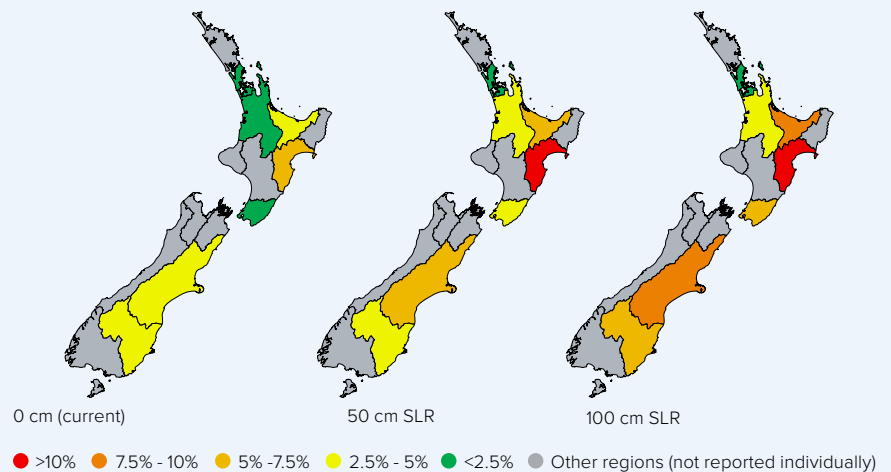
The results of this exercise illustrate the magnitude of river and surface water flood risk in a severe climate change outcome. In Auckland, we found that more than a quarter of the banks' mortgage lending was in the flood zone. This is equivalent to around 12 percent of their total mortgage lending at a national level, under a severe climate change outcome. This exercise has now shown that river and surface water flooding looks to be a greater climate-related hazard for residential mortgages than coastal flooding, in terms of total lending.

### Implications for banks

Climate change-induced increases in flooding risk, and related potential changes in insurance behaviour, are unlikely to be fully captured in current

Figure C.2

## Share of mortgage lending in 1-in-100 year storm tide flood zone by region



Source: Reserve Bank.

Note: Geographic coverage varies somewhat between bank submissions, so aggregate results are approximate; for example results for Christchurch may or may not cover other parts of Canterbury. Results for the residual 'other regions' group were not collected individually as they have relatively low individual mortgage totals, so they are excluded from the regional breakdown in the map.

house prices. Therefore, owners may see a fall in property values in flood zones as we gain an improved understanding of the risks and this is priced into the housing market.

This risk assessment looked into how banks' current mortgage portfolios would be affected by flooding risks out to 2100, assuming no change in the types of properties banks will lend against compared to their current practices. New mortgages typically have a maximum 30 year term, and on average a mortgage's principal will be paid down over a shorter time horizon. This means that, through gaining a deeper understanding of likelihood and extent of future flooding risks, banks can position themselves to avoid being exposed to these risks over time, for example by tightening lending requirements in high risk flood

zones. It also gives banks an opportunity to work with existing customers to manage and mitigate risk.

Importantly for banks, 80 percent of current mortgages in the identified flood zones have LVRs below 60 percent. A low LVR means the mortgage borrower has a significant amount of equity to absorb a decline in property value, if this were to occur faster than the remaining term of the loan. Falls in the value of properties securing mortgages do not on their own lead to losses for banks. However, with less security supporting a loan, a bank would be more exposed to loss in the event a borrower defaults. The impact on bank losses, exploring a range of property value sensitivities, will be analysed in the forthcoming Reserve Bank *Bulletin* article.

<sup>4</sup> Auckland Council maps a 17 percent increase in rainfall depth which corresponds to a 2.1 degree Celsius increase in temperature. This is the temperature outcome in the Network for Greening the Financial System "current policies" scenario, see [here](#). For further information, see [flood prone areas](#) and [flood plains](#) maps.