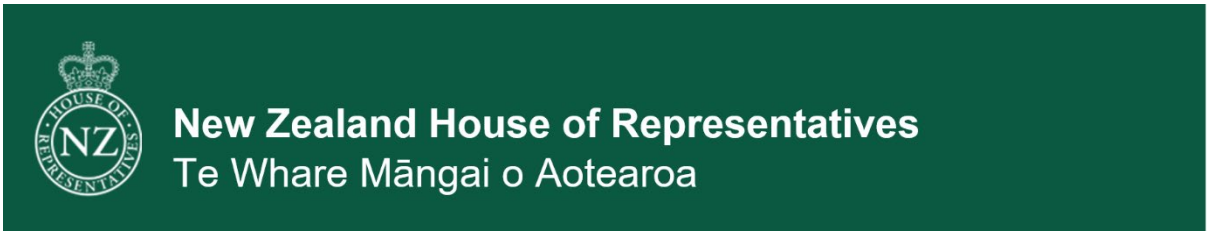


Finance and Expenditure Committee
Komiti Whiriwhiri Take Pūtea, Take Whakapaunga Pūtea

54th Parliament
September 2024

Inquiry into climate adaptation

Presented to the House of Representatives
by Stuart Smith, Chairperson

Contents

Inquiry into climate adaptation

Summary of recommendations

The Finance and Expenditure Committee has conducted an inquiry into climate adaptation and makes the following recommendations.

Objectives, principles, and system design:

- We recommend to the Government that the climate adaptation framework should have the following objectives:
    - **Minimising expected long-term costs**—Minimise expected long-term costs to the Crown and society from the impacts of natural hazards on where people live and work and the associated infrastructure. This will include managing the Crown's fiscal exposure and other social costs and incentivising investment in the long-term interests of New Zealanders.
    - **Ensuring that responses and funding support to property owners, if any, are predictable, principled, fair, and rules-based wherever possible**—Give as much clarity and certainty to New Zealanders as possible about the Government's response to adaptation challenges and the roles of insurers, local government, iwi/Māori, and other groups.
    - **Improving information flows about climate risks and responses**—Increase consistency of and access to quality information about hazards and risks to support sound decision-making.
    - **Addressing market failures and supporting market efficiency**—Contribute to maintaining effective housing, financial, and insurance markets. Focus on areas where there is market failure.
    - **Achieving a balance between central government leadership and community-led approaches**—Empower individuals and communities by taking a decentralised, rather than top-down, approach.
    - **Ensuring people have the incentive and the ability to manage risk**—Central government should focus on ensuring that others, including banks and insurance providers, have the incentive and ability to reduce risk where they can. Decisions and resourcing for adaptation should sit at the lowest level that internalises costs. This will encourage a more efficient response and reduce moral hazard created when individuals or groups do not face the downside risk from their own decisions.
    - **Reducing hardship and supporting an equitable approach**—Reduce hardship due to the impacts of climate change and adaptation. Consider that distributional effects and associated hardship of price impacts are managed over time.
    - **Upholding te Tiriti o Waitangi**—The adaptation framework should ensure that the Crown is fulfilling its obligations as a partner in te Tiriti o Waitangi. The Government should work with iwi/Māori to develop what this means in practice for the adaptation framework. Options could include:
        - resourcing for planning and adaptation action

        - bespoke arrangements that recognise whenua Māori and cultural infrastructure, similar to the Kaupapa Māori pathway in FOSAL (Future of Severely Affected Land)
        - incorporation of mātauranga Māori in risk assessments
        - collaboration in decision-making and governance.
    - **Allowing asset prices to better reflect long-term natural hazard risk**—The more that asset and insurance prices reflect risk, the more efficient outcomes will be. However, price impacts that arise as risk increases over time and the associated hardship may be considered inequitable.
    - **System clarity and continuity**—There needs to be alignment across policy, including resource management and emergency management systems. The system should also be consistently implemented and developed over time, rather than being subject to significant changes or reversals.
- We recommend to the Government that the climate adaptation framework, in seeking to achieve its objectives and navigate trade-offs, should be guided by the following principles:
    - **Fairness and equity**—The framework should support fairness and an equitable approach for and between communities and across generations.
    - **National consistency**—Standards and processes should be broadly consistent across regions to ensure fairness.
    - **Subsidiarity**—Decisions and resourcing should sit at the lowest possible or practical level that bears the direct impact of decisions.
    - **Local flexibility**—Communities should have the opportunity to tailor adaptation responses to local circumstances and preferences.
    - **Incorporating the specific rights and interests of Māori**—Iwi/Māori should have the ability to make their own decisions and be involved in governance: a partnership approach.
    - **Fair warning**—Individuals should be responsible for managing their own natural hazard risk when making decisions. The longer the information about the risk has been available, the less case there is for socialising the cost if the risk is realised.
    - **Minimising moral hazard**—Situations should be avoided where property owners are disincentivised to manage risk because they do not face the full costs of risks materialising.
    - **Accountability**—All actors in the system take the actions they are responsible for.
    - **Transparency and clarity**—Rules are applied, and seen to be applied, clearly and consistently.
    - **Consideration of co-benefits**—Consideration of the costs and benefits of mitigation actions should include co-benefits (such as emissions reduction, improving biodiversity).
    - **Evidence-based decisions**—Decision-making is resourced and supported by data, information, local knowledge, and mātauranga Māori where available.
- We recommend to the Government that the climate adaptation framework should include meaningful performance reporting measures that can show how the framework is performing over time and the extent to which it is achieving its intended outcomes.

Who does what?:

- We recommend to the Government that there should be a comprehensive national framework set out in legislation that establishes a clear mandate for local and central government, and resourcing and financing arrangements, as it relates to climate adaptation. The framework should establish a system where all actors are incentivised and able to act on climate adaptation.
- We recommend to the Government that all decisions about infrastructure, planning, and development must consider climate adaptation. This includes policy workstreams such as regional deals, the infrastructure pipeline, the Regional Infrastructure Fund, the replacement for the Resource Management Act, and interim planning measures that prevent development and intensification in risk-prone areas.
- We recommend to the Government that there should be a lead agency on climate adaptation that can support an all-of-government approach, partner with iwi/Māori, interact with the public and key stakeholders, and have responsibility for reporting on climate adaptation progress and the framework's performance.

Who pays for investment in climate adaptation?:

- We recommend to the Government that it work with local government, researchers, and the private sector to compile information about what is currently being spent on climate adaptation and improve estimates of the potential future costs of adaptation.
- We recommend to the Government that investment in climate adaptation should be paid for by applying a combination of the following principles: beneficiary pays, exacerbator pays, public pays, and ability-to-pay.

How are costs shared for residential property retreat?:

- We recommend to the Government that a key consideration of the adaptation framework should be to ensure there is adequate housing for people who need to relocate, including those who do not own their own property.
- We recommend to the Government that it consider the Expert Working Group on Managed Retreat's recommendations regarding the Government's role in planned relocation.
- We recommend to the Government that it consider the Expert Working Group on Managed Retreat's statement that: "avoiding hardship by structuring funding so as to provide adequate housing to those who must relocate was a key consideration. Based on the outcomes and principles for planned relocation and funding, we did not consider that preserving people's wealth or protecting property owners from the risks of property ownership were legitimate objectives of the funding system."
- We recommend to the Government that any policy work it undertakes regarding residential property retreat or managed relocation include a focus on affected renters and people who do not own property.
- We recommend to the Government that it investigate the idea of proactive financing instruments, working alongside banks and insurance companies to do so.
- We recommend to the Government that it undertake further work to identify what amendments to legislation and regulations would be required to enable residential property retreat.

Kaupapa Māori:

- We recommend to the Government that the climate adaptation framework should involve bespoke arrangements for whenua Māori, recognising the different models of land ownership and the effects of climate change on that land.
- We recommend to the Government that the climate adaptation framework should recognise a role for mātauranga Māori alongside other knowledge systems.

Data and information:

- We recommend to the Government that it develop an accessible public data commons for data on natural hazard and climate risk, with the aim of improving the data's quality, consistency, and availability.
- We recommend to the Government that it prioritise funding research that seeks to improve the data on natural hazard and climate risk.

Special debate in the House:

- We have written to the Business Committee asking that this report be debated in the House under Standing Order 80.

1 Introduction

The Government is developing a framework that will guide how New Zealand adapts to the effects of climate change. The purpose of this inquiry is for Parliament to recommend what the framework could involve.

We wish to acknowledge officials, and the clerks of the Finance and Expenditure Committee who worked at immense pace with complex material and frequently divergent direction from elected members to bring this report together under serious time pressure.

We note that the short turnaround that the Government prescribed for this inquiry has limited the value, quality, and scope of this report and its findings. While the intention was to find cross-party consensus on critical issues—and important progress has been made—at the point of deliberation some members feel we have still been left with a number of recommendations that remain vague, open to very different interpretations, and seem at times contradictory. These members worry about the report not answering some of the most challenging questions around, for example, the weighting given to allocative principles on "who pays", and thus worry about its value in directing officials in legal drafting.

We emphasise that in order to ultimately build a meaningful, coherent, cross-partisan, and enduring climate adaptation framework for New Zealand, there is still a lot of work to do in the consequent processes to negotiate and draft the bill that follows this inquiry. We recommend that these next steps continue to be progressed in a cross-partisan manner.

1.1 Our view of the problem

This section sets out our cross-party view of the nature of the climate adaptation problem.

Adaptation and the expected effects of climate change

Climate adaptation is the process of adjusting to the actual or expected effects of climate change. Although their exact nature and magnitude are uncertain, some of these effects will be gradual, such as rising sea levels and incremental changes in rainfall, wind, and temperature. Other effects are likely to be more acute, such as more frequent and more extreme weather events.

Climate change is increasing the damage and cost associated with both types of effects. An academic study found that 30 percent of the damage from the 12 worst floods in New Zealand over the decade 2007 to 2017 was directly attributable to climate change.[1] The Climate Change Adaptation Technical Working Group found that the cost of weather events to the land transport network has increased from about $20 million each year to over $90 million.[2]

[1] David Frame et al, Climate change attribution and the economic costs of extreme weather events: a study on damages from extreme rainfall and drought, 20 May 2020.

[2] Climate Change Adaptation Technical Working Group, Adapting to Climate Change in New Zealand: Stocktake Report from the Climate Adaptation Technical Working Group, 1 December 2017.

As the number and value of assets in the country increases over time, there will also be increasing exposure to climate risk. Many New Zealanders live in areas susceptible to an increasing level of risk. In 2017 the Working Group mentioned above estimated that 750,000 New Zealanders, and 500,000 buildings worth over $145 billion in total are near rivers and coastlines already exposed to extreme flooding.[3]

While the increase in risk exposure will be experienced across all communities in New Zealand, there are likely to be considerable consequences if insufficient action is taken to reduce climate risk. These include:

- profound effects on individuals, households, firms, and communities including stress, cultural harm, and damage to social cohesion, as well as financial effects like uninsured losses, changing property values, and higher rates
- high fiscal costs that could challenge government's fiscal sustainability, including the cost of losing, repairing, and recovering assets and infrastructure after weather events
- economic losses that are likely to exceed economic benefits.
- complexities related to Māori land, including the location of culturally significant sites, historical considerations, the current location of some Māori communities, and lower socio-economic status. We note that the Crown's obligations to Māori are discussed further by the Expert Working Group on Managed Retreat.[4]

Current approaches to climate adaptation

In the current system for managing natural hazards and climate risks, the risks, costs, and responsibilities are shared across private asset owners, councils, insurers, and central government. Councils are statutorily responsible for land use planning and addressing natural hazard risk. Approaches to climate adaptation include responses to major weather events, and to projected or emerging local needs.

The current system is under stress. A more strategic and proactive approach is needed—one that addresses the following problems:

- development in high-risk locations where risk cannot be managed in a cost-effective way, or where the development has worsened risks elsewhere
- uncertainty over decisions about managed retreat in situations where risks have become intolerable and no other risk management tools are cost-effective
- underinvestment at the local level into actions to accommodate or protect against risk
- a lack of consistent and accessible data and information on current and future risk levels, without which asset prices may not truly reflect risk
- the disproportionate effects of climate change on Māori communities and cultural infrastructure due to the location and heightened exposure to risk of whenua Māori, historical dispossession, and current socio-economic circumstances.

[3] See the previous report.

[4] Ministry for the Environment, Report of the Expert Working Group on Managed Retreat: A Proposed System for Te Hekenga Rauora/Planned Relocation, August 2023, pp 9–10.

In summary

We view the climate adaptation problem as:

- complex, involving many different actors and policy levers, and links to different systems and pieces of legislation
- long-term, with climate impacts and investments to mitigate risk occurring over long periods of time
- uncertain, for example as it relates to when hazards will occur, how big their impacts will be, and how risks will change over time
- involving imperfect and incomplete information, with issues relating to the availability, quality, and accessibility of data on climate risk and natural hazards
- contentious, with differing views on issues such as property rights and fairness, and the potential for litigation
- involving significant Māori rights and interests, including the issue of preserving whenua Māori in Māori ownership
- involving how the Crown can best effectively partner with Māori
- involving trade-offs and value judgements.

The framework that the Government is developing, and that this inquiry will influence, needs to establish an enduring and cohesive approach to climate adaptation. The framework should clearly set out objectives, guiding principles, roles, and responsibilities. It needs to help New Zealand to adapt to climate change in a way that minimises overall long-term social and fiscal impacts, while addressing issues of wellbeing, fairness, and transition. It needs to enable the Crown to uphold its partnership obligations under te Tiriti, recognising specific Māori interests. It should incentivise and enable adaptation, risk reduction, and market responses to occur during any transition period, while being flexible to respond to emerging information in an environment of inherent uncertainty.

1.2 Parliamentary process and terms of reference

The Māori Affairs Committee of the 53rd Parliament conducted a briefing on Māori climate adaptation. On 5 July 2023, it presented its final report to the House, recommending 22 principles that the Government should consider as it develops law and policy related to climate adaptation. (See Appendix C for this list of principles.)

On 24 August 2023, the Environment Committee of the 53rd Parliament opened an inquiry into climate adaptation. The inquiry was requested by the Minister of Climate Change, who said the committee's findings would inform the development of a Climate Change Adaptation Bill. On 14 December 2023, the inquiry was reopened by the Environment Committee of the current (54th) Parliament, which received written submissions from approximately 150 groups and individuals.

On 9 May 2024, the Environment Committee ended its inquiry without undertaking any substantive consideration, nor hearing any evidence.[5] Its report explained that this was at the request of the Minister of Climate Change, Hon Simon Watts, who moved a motion in the

[5] Environment Committee, Final report (Inquiry into climate adaptation), 9 May 2024.

House that same day to refer an inquiry to this committee instead. The Minister said our committee was the appropriate group to undertake the inquiry because we have members from all political parties in the House. This representation is essential for achieving political consensus. The Minister's motion was supported unanimously.

Terms of reference

The inquiry was referred to us with the following terms of reference:

(1) The purpose of the inquiry is to develop and recommend high-level objectives and principles for the design of a climate change adaptation model for New Zealand, to support the development of policy and legislation to address climate adaptation.

(2) For this purpose, the committee must consider the following topics:

  (a) the nature of the climate adaptation problem New Zealand faces

  (b) frameworks for investment and cost-sharing

  (c) roles and responsibilities

  (d) climate risk and response information-sharing.

(3) The committee may, as it thinks fit, consider other matters relevant to the purpose of the inquiry.

(4) The committee must take account of submissions received by the Environment Committee on its recent inquiry into climate adaptation.

(5) The committee must finally report on the inquiry by 5 September 2024.

These terms of reference differ somewhat from those of the Environment Committee, which emphasised community-led retreat.[6] Our committee has a greater focus on economic issues.

On 23 May 2024, we opened for public submissions on the inquiry with a deadline of 16 June 2024. (See Appendix B for the text of the call for submissions.) We also contacted the submitters on the Environment Committee's inquiry. We informed them that we would consider their original submission and that they were welcome to make a supplementary submission with any new information that they wished to share. We published a summary of the submissions made to the Environment Committee online.[7]

We spoke with 82 submitters at hearings in July and August 2024. These hearings supplemented the written information that we and the Environment Committee received. We thank all members of the public who generously took the time to provide us with information in writing or verbally.

We appointed the Ministry for the Environment and the Treasury as advisers on the inquiry. They attended public hearings and sat in on our private consideration. They considered possible policy options in response to public submissions and our questions and outlined these options to inform our thinking. We also appointed the Parliamentary Commissioner for

6 The terms of reference for the Environment Committee's inquiry are available on the Parliament website.

7 Ministry for the Environment, Summary of submissions to the Environment Committee, 22 May 2024.

the Environment and Dr David Hall to provide independent specialist advice. On 23 July 2024, the Parliamentary Commissioner for the Environment withdrew from the role of adviser due to resourcing and time constraints. We thank all our advisers for their work on this important matter.

On 7 August 2024, we agreed to ask the Business Committee to extend the deadline for our report from 5 September to 1 October 2024. It agreed to this extension on 20 August 2024. We used the additional time to consider further advice and refine this report.

1.3 Structure and nature of this report

Each of the following chapters of our report has roughly the same structure:

- first, a brief overview of some of the written and oral information received from the public submissions relating to the chapter topic
- second, a summary of the information we received from our advisers on the topic
- third, our opinions on the chapter topic, and recommendations.

Our discussion of information from the public is brief and only a high-level summary of what we broadly see as the main themes. Any readers who wish to know more about the full range of views expressed by submitters can access all of the written and oral submissions on the Parliament website. Similarly, our discussion of the information provided by advisers is only an overview. All of the advice we received can also be accessed on the Parliament website. (Refer to Appendix A for weblinks.)

The inclusion of information from the public and advisers in this report is not an endorsement. It is simply an account of the key material that we received. The conclusions we reached based on this material and our discussions are expressed only in this introduction, and in the *Committee opinion* and *Recommendations* sections of this report.

2 Objectives, principles, and system design

2.1 Information from the public

We heard from submitters that the adaptation framework should be nationally led with local flexibility. We were told that there should be a comprehensive and co-ordinated approach to adaptation that has clear roles and responsibilities and is integrated with other related legislation and policies.

Some of the objectives and principles suggested to us by submitters are:

- upholding fairness and equity
- upholding the rights and interests of Māori
- upholding private property rights
- minimising long-term costs and ensuring affordability
- proactively reducing risk to life and property, and increasing resilience
- ensuring decision-making is based on evidence
- supporting action on environmental sustainability
- safeguarding, improving, and prioritising public health and wellbeing
- supporting education and awareness about adaptation, as well as collaborative planning
- supporting localism
- minimising moral hazard.

2.2 Information from the Ministry for the Environment and the Treasury

Cabinet objectives

Advisers noted that, in April 2024, Cabinet agreed in principle to the following five objectives for the adaptation framework:[8]

Objective	Explanation
Minimising expected long-term costs.	Minimise the total cost to the Crown and society of the impacts of natural hazards on where people live and work and the associated infrastructure. This will include managing the Crown's fiscal exposure.
Ensuring that responses and funding support to property owners, if any, are predictable, principled, fair, and rules-based wherever possible (i.e. not decided after each event).	Give as much clarity and certainty to New Zealanders as possible about the Government's response to adaptation challenges and the roles of insurers, local government, and other groups.

8 Cabinet paper, CAB-400 Progressing an adaptation framework, 15 April 2024.

Objective	Explanation
Improving information flows about climate risks and responses	Increase consistency and access to quality information about hazards and risks to support sound decision-making.
Addressing market failures and supporting market efficiency.	Contribute to maintaining effective and efficient housing, financial, and insurance markets. Focus on areas where there is market failure but empower individuals and communities by taking a decentralised, rather than top-down, approach.
Ensuring people have the incentive and the ability to manage risk.	Central government should focus on ensuring that others have the incentive and ability to reduce risk where they can. Decisions and resourcing for adaptation should sit at the lowest level that internalises costs. This will encourage a more efficient response and reduce moral hazard created when individuals or groups do not face the downside risk from their own decisions. At the same time, this objective allows for interventions to alleviate equity or undue hardship where necessary.

Possible objectives arising from submissions

Based on their analysis of submissions, advisers also articulated the following three possible objectives for our consideration:

Objective	Explanation	Implications
Upholding te Tiriti o Waitangi	Submitters said the adaptation framework should ensure that the Crown is fulfilling its obligations as a partner in te Tiriti o Waitangi.	The Government could work with iwi/Māori to develop what this means in practice for the adaptation framework. Submitters' suggestions included: • resourcing for planning and adaptation action • bespoke arrangements that recognise whenua Māori and cultural infrastructure, similar to the Kaupapa Māori pathway in FOSAL (Future of Severely Affected Land) • incorporation of mātauranga Māori in risk assessments • involvement in decision-making and governance.

Objective	Explanation	Implications
Asset prices should better reflect long-term natural hazard risk	Submitters noted that asset prices do not adequately reflect long-term natural hazard risk, clouding judgements on asset purchase and ownership.	The more that asset and insurance prices reflect risk, the more efficient outcomes will be. However, price impacts that arise as risk increases over time and the associated hardship may be considered inequitable.
System clarity and continuity	Submitters emphasised the importance of alignment across policy, including resource management and emergency management systems. Submissions also called for a system that is consistently implemented and developed over time, rather than being subject to significant changes or reversals. Submissions asked for clarity in the system on how the costs of adaptation will be met, under what circumstances, and by whom.	The more that authorities and infrastructure providers lock in their plans for managing risk over the long term, the more certainty asset owners have but the less flexibility authorities and infrastructure providers have to adapt their intentions as more information emerges.

Possible principles arising from submissions

Guiding principles will inform how the objectives of the adaptation framework might be interpreted and used in decision-making. This is especially important given the complexity and uncertainty associated with climate adaptation. Based on submissions, advisers articulated the following possible principles for our consideration:

Possible principles for how the framework is designed

- **National consistency**—Standards and processes should be broadly consistent across regions to ensure fairness.
- **Subsidiarity**—Decisions and resourcing should sit at the lowest level that bears the direct impact of decisions.
- **Local flexibility**—Communities should have the opportunity to tailor adaptation responses to local circumstances and preferences.
- **Incorporating the specific rights and interests of Māori**—Iwi/Māori should have the ability to make their own decisions and be involved in governance: a partnership approach.
- **Fair warning**—Individuals should be responsible for managing their own natural hazard risk. The longer the information about the risk has been available, the less case there is for socialising the cost if the risk is realised.

- **Minimising moral hazard**—Situations should be avoided where property owners are disincentivised to manage risk because they do not face the full costs of risks materialising.
- **Equity and fairness**—The principle of being fair and impartial, often also aligned with ideas of equality and justice. It provides a basis for understanding how the impacts of, and responses to, climate change (including costs and benefits) are distributed in and by society in more or less equal ways. The principle can be applied in understanding who is responsible for climate impacts and policies; how those impacts and policies are distributed across society, generations, and gender; and who participates and controls the processes of decision-making.

  This is an umbrella principle; submissions contained varying interpretations of this principle and how it might be implemented within an adaptation framework. It could describe:
  - ensuring that everyone has enough of the basics and no one is "left behind"
  - prioritising those who face more hardship or have lower living standards
  - supporting all affected people equally.

Possible principles for implementing the adaptation framework

- **Accountability**—All actors in the system take the actions they are responsible for.
- **Transparency and clarity**—Rules are applied, and seen to be applied, clearly and consistently.
- **Evidence-based decisions**—Decisions are supported by data, information, local knowledge, and mātauranga Māori where available.
- **Consideration of co-benefits**—Consideration of the costs and benefits of mitigation actions should include co-benefits (e.g. emissions reduction, improving biodiversity).

Possible principles for the funding and financing of the adaptation framework

- **Beneficiary pays**—Where practical, services should be funded by those who benefit from them.
- **Exacerbator pays**—Those who exacerbate natural hazard risks should pay for the cost of the response to, or prevention of, the risk.
- **Ability-to-pay**—People with greater ability to pay should be expected to pay more.

2.3 Information from our independent specialist adviser

Transformative change

Our independent specialist adviser suggested that transformative change will be necessary in some circumstances to fulfil Cabinet's objectives for adaptation policy. Transformative change includes managed retreat, economic transition, major land use change, new technological regimes, cultural shifts, and change in natural ecosystems to new ecological equilibria.

Our independent specialist agreed that increasing resilience by reducing risk to life and property is a reasonable goal in many situations. However, for some assets, systems, and activities, increasing resilience is unlikely to ensure continuity. He said this is especially true

when there are incremental, long-run risks like sea-level rise or more frequent and intense droughts. Transformative change will very likely be needed in some, but not necessarily all, situations.

He acknowledged that transformative change can be uncomfortable. However, he said that the adaptation framework could be proactive about transformative adaptation and articulate the roles of government, financial providers, and others to support communities to be "masters of their own destiny" despite transition and change. He said this is preferable to a reactive approach where communities are victims of circumstance and left to transform by external shocks. We were advised that the latter may result in an overinvestment in resilience and an overexposure to risks and hazards as communities try to sustain business as usual, rather than accept the need and opportunity for new beginnings.

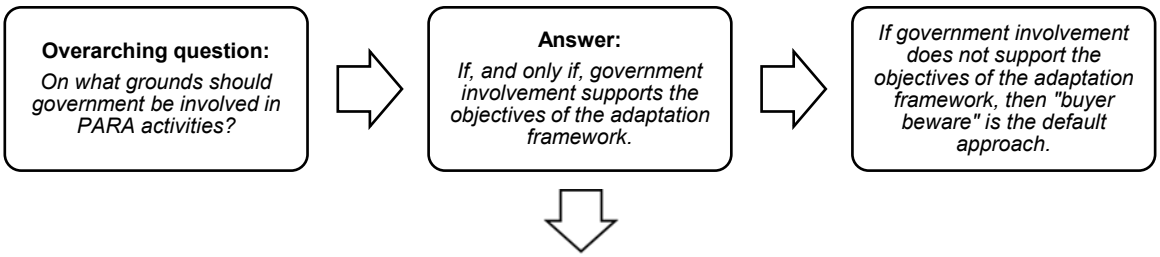
Thinking through the implications of Cabinet's objectives

Our independent specialist adviser helped us think through the implications of the objectives Cabinet has agreed to in principle. If government adopts certain objectives, it follows that it should only take actions that support those objectives. Our adviser prompted us to consider whether the actions implied by the objectives are desirable.

Actions that can be taken to reduce climate risk can be thought of in four broad categories: protect, avoid, retreat, and accommodate (the PARA framework).

Protect	Avoid	Retreat	Accommodate
Staying in place and building defences, e.g. stopbanks and sea walls.	Staying away from areas where the risk is too high, e.g. restricting or preventing development and making changes to existing land use.	Purposely moving away from areas where the risk is too high, e.g. red zoning, placing restrictions on land use and relocating community assets.	Staying in place and making changes to buildings and infrastructure to improve resilience.

Using Cabinet's objectives as a screening tool, we can see when government involvement in PARA activities might be warranted, and what actions this could potentially entail. Deciding whether these actions are desirable can help us to determine whether the objectives of the framework are appropriate.



Objective	Possible government involvement could include:
Minimising expected long-term costs	avoiding development in hazard-prone areas when the future costs of infrastructure repair and emergency responses are likely to exceed tax/rates revenue
	enabling or supporting protection and accommodation when the benefit-cost ratio is positive
	enabling or supporting retreat and other types of transformative adaptation when this costs less than upholding resilience against intensifying and irreversible risks
Ensuring responses and funding are predictable, principled, fair, and rules-based	continuing to support PARA activities when has done so in the past, potentially with a clearly signalled phase-out date if the policy no longer aligns with framework's objectives
	not exercising emergency powers (for example, forcing retreat or imposing protective infrastructure) without clear, principled justification when PARA activities infringe upon pre-existing rules and conceptions of fairness (for example, private property rights and te Tiriti o Waitangi)
Improving information flows about climate risks and responses	commissioning modelling that reduces the uncertainty of benefit-cost ratios to support private investment into protection and accommodation
	commissioning new research on climate risks and spatial planning, and facilitating open access and interoperability of existing data sets to support planning decisions
Addressing market failures and supporting market efficiency	appropriately regulating insurance and banking sectors to enable and encourage PARA activities
	procuring research to address imperfect information which PARA depends upon
	supporting strategic research and development for future PARA technologies for which markets are not yet developed
	creating swift and adaptive industry standards to accelerate the implementation of protection and accommodation technologies and practices
	directly supporting any other PARA activities that are inhibited by a well-defined market failure
Ensuring people have the incentive and the ability to manage risk	supporting protection and accommodation only if it does not encourage risk-taking, and does not crowd out private investment by asset owners
	supporting low-income households and communities to protect, accommodate, and retreat when they lack the resources or capabilities to respond appropriately to risks and incentives

The meaning of fairness

Our independent specialist adviser noted that fairness has multiple, legitimate meanings. Fairness is sometimes associated with the idea of impartiality, where each person is treated the same as all others. This can involve equality of outcomes; for instance, every affected person receives the same support. It can also involve equality of opportunity; for instance, as long as all people have access to information about risks, then outcomes will be fair even if

they are unequal (i.e. caveat emptor). However, fairness is also sometimes associated with partiality; for instance, recognising people's different circumstances and working even-handedly to address those imbalances. This is often defined as equity.

These different meanings were present in submissions. Our independent specialist adviser noted that concepts like justice and fairness are "essentially contested concepts", which means that there is no single meaning, rather a surplus of meaning which varies across political perspectives. He said that, even if its meaning is contested, fairness was clearly important to most submitters, so further work might be undertaken to articulate those different understandings.

2.4 Committee opinion

We set out below the objectives and principles that we recommend should guide the climate adaptation framework. We discuss in chapter 4 the specific principles we support relating to investment into climate adaptation.

2.5 Recommendations

- We recommend to the Government that the climate adaptation framework should have the following objectives:
    - **Minimising expected long-term costs**—Minimise expected long-term costs to the Crown and society from the impacts of natural hazards on where people live and work and the associated infrastructure. This will include managing the Crown's fiscal exposure and other social costs and incentivising investment in the long-term interests of New Zealanders.
    - **Ensuring that responses and funding support to property owners, if any, are predictable, principled, fair, and rules-based wherever possible**—Give as much clarity and certainty to New Zealanders as possible about the Government's response to adaptation challenges and the roles of insurers, local government, iwi/Māori, and other groups.
    - **Improving information flows about climate risks and responses**—Increase consistency of and access to quality information about hazards and risks to support sound decision-making.
    - **Addressing market failures and supporting market efficiency**—Contribute to maintaining effective housing, financial, and insurance markets. Focus on areas where there is market failure.
    - **Achieving a balance between central government leadership and community-led approaches**—Empower individuals and communities by taking a decentralised, rather than top-down, approach.
    - **Ensuring people have the incentive and the ability to manage risk**—Central government should focus on ensuring that others, including banks and insurance providers, have the incentive and ability to reduce risk where they can. Decisions and resourcing for adaptation should sit at the lowest level that internalises costs. This will encourage a more efficient response and reduce moral hazard created when individuals or groups do not face the downside risk from their own decisions.
    - **Reducing hardship and supporting an equitable approach**—Reduce hardship due to the impacts of climate change and adaptation. Consider that distributional effects and associated hardship of price impacts are managed over time.

- **Upholding te Tiriti o Waitangi**—The adaptation framework should ensure that the Crown is fulfilling its obligations as a partner in te Tiriti o Waitangi. The Government should work with iwi/Māori to develop what this means in practice for the adaptation framework. Options could include:
  - resourcing for planning and adaptation action
  - bespoke arrangements that recognise whenua Māori and cultural infrastructure, similar to the Kaupapa Māori pathway in FOSAL (Future of Severely Affected Land)
  - incorporation of mātauranga Māori in risk assessments
  - collaboration in decision-making and governance.
- **Allowing asset prices to better reflect long-term natural hazard risk**—The more that asset and insurance prices reflect risk, the more efficient outcomes will be. However, price impacts that arise as risk increases over time and the associated hardship may be considered inequitable.
- **System clarity and continuity**—There needs to be alignment across policy, including resource management and emergency management systems. The system should also be consistently implemented and developed over time, rather than being subject to significant changes or reversals.

- We recommend to the Government that the climate adaptation framework, in seeking to achieve its objectives and navigate trade-offs, should be guided by the following principles:
  - **Fairness and equity**—The framework should support fairness and an equitable approach for and between communities and across generations.
  - **National consistency**—Standards and processes should be broadly consistent across regions to ensure fairness.
  - **Subsidiarity**—Decisions and resourcing should sit at the lowest possible or practical level that bears the direct impact of decisions.
  - **Local flexibility**—Communities should have the opportunity to tailor adaptation responses to local circumstances and preferences.
  - **Incorporating the specific rights and interests of Māori**—Iwi/Māori should have the ability to make their own decisions and be involved in governance: a partnership approach.
  - **Fair warning**—Individuals should be responsible for managing their own natural hazard risk when making decisions. The longer the information about the risk has been available, the less case there is for socialising the cost if the risk is realised.
  - **Minimising moral hazard**—Situations should be avoided where property owners are disincentivised to manage risk because they do not face the full costs of risks materialising.
  - **Accountability**—All actors in the system take the actions they are responsible for.
  - **Transparency and clarity**—Rules are applied, and seen to be applied, clearly and consistently.
  - **Consideration of co-benefits**—Consideration of the costs and benefits of mitigation actions should include co-benefits (such as emissions reduction, improving biodiversity).
  - **Evidence-based decisions**—Decision-making is resourced and supported by data, information, local knowledge, and mātauranga Māori where available.

- We recommend to the Government that the climate adaptation framework should include meaningful performance reporting measures that can show how the framework is performing over time and the extent to which it is achieving its intended outcomes.

3 Who does what?

Our terms of reference have tasked us with considering roles and responsibilities in the climate adaptation system. A key function of the adaptation framework will be to clarify who is responsible for doing what.

3.1 Information from the public

Some of the key actors identified by submitters, and the functions they could fulfil, are:

- **Local government**—We were told that local councils are best positioned to understand the unique risks facing specific areas. They could tailor measures to address risks appropriately. However, this would require a clear legislative mandate and statutory powers.
- **Central government**—Central government's role in leading New Zealand's response to adaptation could include developing legislation and national direction; providing funding, planning guidance, standardised risk assessment processes, and access to data; leading on matters of national significance or where a local authority needs particular support; and coordinating, monitoring, and reporting on adaptation across the system.
- **Iwi/Māori**—Iwi/Māori could play a significant role in adaptation planning, particularly where land, values, or ecosystems are of importance to Māori, and decisions need to be made that affect them. Submitters proposed equal decision-making powers between tangata whenua and tangata Tiriti. However, submitters noted that Māori would need to be adequately resourced and supported.
- **Businesses and communities**—Collaborative, local decision-making that includes all interested groups such as businesses could help to ensure buy-in and recognition of local preferences and other priorities.
- **Infrastructure providers**—We heard about the legal constraints on infrastructure providers preventing them from withdrawing services, which could encourage people to stay in risk-prone areas. We were told that infrastructure businesses need to understand the needs of their local customers, and a shared view needs to be reached about what is needed for resilience planning and implementation.
- **Banking and insurance**—The role of the banking and insurance sectors could involve contributing to the cost of adaptation, providing visibility on the affordability and insurability of properties, helping to develop risk management strategies, and recognising property owners' risk mitigations when setting premiums.

Other topics submissions touched on include:

- the need for coordination and collaboration between actors when planning for climate adaptation
- the desire for climate adaptation to be a consideration in all planning and decision-making, as opposed to the current uncoordinated, patchwork approach

- the difficulties in achieving coordinated and robust planning when there are conflicting or inconsistent timeframes across various obligations
- whether to include managed retreat (whether voluntary or mandatory) in the framework
- whether the decisions made by local government bodies on climate adaptation should be open to legal challenge
- the need to build sector-wide capacity and capability for adaptation, recognising that adaptation planning (including risk assessments) is highly resource-intensive and time-consuming.

3.2 Information from the Ministry for the Environment and the Treasury

Advisers described in general terms how responsibilities for adapting to climate change are currently shared:

Individuals, groups, and firms are expected to pay for private goods. These are goods and services where the benefits can be limited to only people who pay for them ("excludable" benefits).

For example, a homeowner is expected to cover the cost of their home insurance or the construction of a retaining wall on their property, rather than having others pay for it. Since the homeowner is the one realising the benefits of these actions, they bear the costs. This enables people to act in line with their own risk tolerance, within legal limits.

Local government provides local public goods. These are goods and services where the benefits are shared only within a limited geographic area. They are "non-rivalrous" (one person's use does not diminish the ability of others to use them), and non-excludable.

An example is the construction of a stopbank to protect a residential suburb from flood risks. All else equal, those who benefit are expected to pay, for example through targeted rates.

Central government provides national public goods. These are goods and services where the benefits are shared nationally, are non-rivalrous, and non-excludable. Central government manages the costs of and risks to its own assets. All else equal, the beneficiaries of public goods pay through tax. Central government also acts for other reasons, for example to:

- manage externalities, such as laws to prevent development on one property damaging another
- address concerns about equity, fairness, and undue hardship, such as by providing support to poorer communities
- ensure consistency, such as with planning laws to ensure a degree of predictability of development rules nationwide
- manage issues of overwhelming scale, such as mustering resource following a major disaster.

Advisers also outlined these responsibilities in more detail in the following graphic:

Overview of current key responsibilities for natural hazard adaptation

	Inform	Avoid	Retreat	Accommodate	Protect	Transfer	Ready, Respond, and Recover
	Responsibilities for collecting, sharing, and seeking information on risk. E.g., flood maps.	Responsibilities for limiting assets and people from at-risk areas. E.g., district plans.	Responsibilities for moving assets out of at-risk areas. E.g., relocation.	Responsibilities for changing assets to mitigate their vulnerability. E.g., raising a house.	Responsibilities for services that stop hazards from reaching assets. E.g., stop banks.	Responsibilities for sharing risk between entities and over time. E.g., insurance.	Responsibilities for getting ready for when risks materialise and responding and recovering when they do. E.g., emergency plan.
Individuals, groups, and firms ***have responsibility to bear the costs and the benefits of the risks they take.***	**Are expected** to seek information specific to their own context, when relevant. Some firms **are obligated** to report on climate-related financial disclosures. ***E.g., Beneficiary pays:*** *Collecting information enables private actors to take risks that match their individual tolerance.*	Can decide where to build within consenting constraints, **are obligated to** meet sufficient building standards under relevant building and infrastructure legislation and **needs to** meet bank lending conditions to access finance. ***E.g., Efficiency:*** *Private asset owners are best placed to manage their own risks within constraints set to manage externalities and other market failures.*	**Are expected to** bear the cost of relocating. ***E.g., Beneficiary pays:*** *Private asset owners have responsibility to bear the costs and benefits of the risks they take.*	**Are expected to** bear the cost of investing in their own assets. Under various pieces of legislation, **must ensure** that their assets meet the relevant standards. ***E.g., Beneficiary pays:*** *Asset owners realise the benefits of investments in their assets.*	**Are not obligated** to invest in protection but have done this in the past. ***E.g., Beneficiary pays:*** *Protection services are generally local public goods rather than private goods.*	**Are expected to** make decisions about whether to purchase insurance. This is typically a requirement to obtain a residential mortgage. ***E.g., Efficiency:*** *Individuals, groups, and firms are best placed to make judgements about whether to transfer normal risks.*	**Are expected to** determine their own level of comfort with residual risk and how they will manage it if it materialises. ***E.g., Efficiency:*** *Individuals, groups, and firms have knowledge about their own risk appetite.*
Local Government ***contributes where others cannot and when there are local-level benefits and costs, national consistency is less important, and information and expertise is held locally and cannot be easily transferred or obtained.***	Under the RMA, **is obligated to produce** regional policy statements and plans, which include natural hazard information. ***E.g., Subsidiarity:*** *Local information and expertise is needed, primarily benefits locals, and is a public good.*	Under the RMA, **is obligated to** develop district plans and consider consent applications. ***E.g., Subsidiarity:*** *Local district plans and consents use local information and expertise, and primarily benefit locals.*	**Is not obligated** to support the retreat of highly exposed property but have done this in the past. **Is expected to** bear the cost of relocating local government assets ***E.g., Avoiding undue hardship:*** *Different grounds for contribution have been used in different cases.*	**Is expected to** bear the cost of investing in their own assets. Under various pieces of legislation, **must ensure** that their assets meet the relevant standards. ***E.g., Beneficiary pays:*** *Asset owners realise the benefits of investments in their assets.*	**Is obligated to** manage natural hazard risk under various pieces of legislation, but with no statutorily prescribed level of service. ***E.g., Subsidiarity, beneficiary pays:*** *Natural hazard risk management performed by local government primarily benefits locals, and the information and expertise tends to be held locally.*	**Is expected to** make decisions about whether to purchase insurance. ***E.g., Efficiency:*** *Individuals, groups, and firms are best placed to make judgements about whether to transfer normal risks.*	Under CDEM legislation, **is obligated** to prepare for emergencies and respond when they occur. ***E.g., Subsidiarity, efficiency:*** *Local government have the expertise and knowledge to prepare and support their localities and can more efficiently coordinate emergency response than can individuals.*

	Inform	Avoid	Retreat	Accommodate	Protect	Transfer	Ready, Respond, and Recover
	Responsibilities for collecting, sharing, and seeking information on risk. E.g., flood maps.	Responsibilities for limiting assets and people from at-risk areas. E.g., district plans.	Responsibilities for moving assets out of at-risk areas. E.g., relocation.	Responsibilities for changing assets to mitigate their vulnerability. E.g., raising a house.	Responsibilities for services that stop hazards from reaching assets. E.g., stop banks.	Responsibilities for sharing risk between entities and over time. E.g., insurance.	Responsibilities for getting ready for when risks materialise and responding and recovering when they do. E.g., emergency plan.
Central Government ***contributes where others cannot and when there are national-level benefits and costs, national consistency is important, and information and expertise is held centrally and cannot be easily transferred or obtained.***	Under the CCRA, **is obligated to** a *National Climate Change Risk Assessment* every six years. Under the NHI Act, **is obligated to** to improving awareness and understanding of matters relating to natural hazards. ***E.g., Decisions are evidence-based**: Information is a public good, and there is increasing importance for national consistency of natural hazard information.*	Sets legislation, regulations, and national direction on buildings, infrastructure, land and property ownership. ***E.g., Consistency and certainty**: National consistency on legislation, regulations, and expectations enables the other actors to perform efficiently and effectively and to manage extenalities.*	**Is not obligated** to support the retreat of highly exposed property but has done so on a discretionary basis this in the past. **Is expected to** bear the cost of relocating central government assets ***E.g., Avoiding undue hardship:** Different grounds for contribution have been used in different cases.*	Sets legislation, regulations, and national direction for building standards. Under CO (23) 9, central government entities **are expected to** consider the exposure and vulnerability of their existing and future assets to the effects of significant risks, including those related to climate change. ***E.g., Consistency and certainty**: National consistency on legislation, regulations, and expectations enables the other actors to perform efficiently and effectively.*	**Is not obligated** to invest in protection but has provided some discretionary support to councils in the past. ***E.g., Ability-to-pay:** Discretionary support to build protection has been provided to accelerate investment by local councils or where it is decided councils can't afford it.*	Under NHI Act, NHC **is obligated to** take on seismic and volcanic risk and some flood-related land damage risk through the Natural Hazards Levy. ***E.g., Avoiding undue hardship:** Central government often acts as "insurer of last resort" in the event of high impact, low-likelihood risks materialising which are overwhelmingly large and hard for a private entity to predict.*	Under CDEM legislation, **is obligated** to prepare for emergencies, contribute up to 60% of eligible post-event reconstruction costs for local essential infrastructure, and provide full reimbursement for costs of caring for displaced people. ***E.g., Avoiding undue hardship:** Central government can efficiently muster resources following a major disaster that is too overwhelmingly large for local government or private entities to manage.*
Insurers *enable the spreading of risk in accordance with good practice.*	Seeks and collects information on risk to inform decisions. ***E.g., Efficiency:** Insurers have commercial incentive to collect risk information.*					Can provide insurance that transfers the cost of sudden losses across time and the population. ***E.g., Efficiency:** There is commercial incentive for insurers to facilitate risk transfer in certain circumstances.*	**Must** pay out costs incurred after an event per their contracts with policy holders. ***E.g., Accountability:** Insurers have legal obligations they must meet.*

Issues with the current system

Ministry for the Environment advisers identified three key issues with the current system of roles and responsibilities:

1) No clear mandate:

Local government is the primary decision-maker for local climate adaptation. It has various decision-making powers, located across multiple pieces of legislation. Ministry for the Environment advisers identified that, while some councils are planning for adaptation, there is no explicit requirement to plan for adaptation or to coordinate action across different levels of government.

The mandate for central government to act with regards to climate adaptation is primarily established under the Climate Change Response Act 2002 (to conduct regular national risk assessments, produce an adaptation plan, and maintain an independent Climate Change Commission). Other pieces of legislation establish functions for central government to support risk reduction, disaster response, and related information, coordination, and advice.

2) Barriers to effective implementation:

There are several barriers to effective adaptation planning and risk reduction, including:

- risk of litigation
- long timeframes for many adaptation processes
- landowner opposition
- inefficient tools and gaps in legislation (for example, managing existing uses and managed retreat)
- inability to have full certainty about impacts
- fiscal liability and budget constraints
- complex landowner and cultural affiliations for Māori land
- lack of capacity and capability to do the work
- uncertainty about roles
- poor system design for changing risk profiles
- difficulties “making adaptation decisions stick.”

3) Uncertainty:

In key pieces of legislation, such as the Local Government Act 2002 and the Resource Management Act 1991, there is a lack of clarity about the responsibilities, timeframes, scope, scale, processes, and partnership arrangements for risk reduction, adaptation planning, and responses.

The Climate Change Response Act 2002 and the National Adaptation Plan establish a role for central government in adaptation planning. However, the Climate Change Response Act does not include critical components required to progress adaptation planning. These include directions for planned investment, agency adaptation planning, and the role of central government in regional and local adaptation planning.

There is a lack of clarity about the role of central government in funding pre- and post-disaster events. There is also a lack of visibility about government agency and local authority investment plans, which can strongly influence personal and wider community decisions.

The role of private sector actors such as infrastructure owners or banks is not clear. Their functions have broader social and economic benefits, and how they operate constrains choices by other actors, such as individual property owners or councils.

Roles and responsibilities that need to be strengthened

Advisers identified three primary roles and the associated responsibilities that need to be strengthened for the system to work:

1) Understanding the hazard:

Who categorises the hazard exposure of an area?[9]
Who undertakes the technical assessment to know what hazards may impact an area?
When, at what scale, and how are these hazards changing over time? (E.g. when hazard exposure is increasing or when protective investment reduces the hazard exposure.)
Who will communicate this information to everyone who needs to understand hazard exposure?

2) Assessing risk:

Who evaluates vulnerabilities and risk tolerance, and regularly communicates risks to people and communities?

3) Planning for adaptation:

Who plans and coordinates the responses to risks, such as whether to avoid, protect, retreat, or accommodate risks? This would involve coordination across multiple service providers, iwi and Māori, public interests and private interests, extensive consultation, evaluating risk and options, and making hard decisions.

3.3 Committee opinion

All of society will have a role to play in climate adaptation. Our comments focus on the roles of local and central government, which we see as key to enabling action by others on climate adaptation.

We recognise that clarity is lacking about the responsibilities, timeframes, and processes for climate adaptation in key pieces of legislation such as the Local Government Act 2002 and Resource Management Act 1991. We also recognise that the Climate Change Response Act 2002 does not include critical components required to progress adaptation planning.

There needs to be a comprehensive national framework set out in legislation that establishes a clear mandate for local and central government as it relates to climate adaptation. The framework needs to enable coordination between actors when planning for adaptation and establish who is responsible for understanding hazard exposure and assessing risk. We

[9] Exposure to a hazard means that an asset may be impacted by the hazard in some way. The impact could be of any scale, depending on the magnitude of the hazard and the vulnerability of the asset to that hazard.

believe central government has a leading role to play, especially in the short term, to establish a well-functioning system.

We heard clearly from submitters that local government already has many functions to fulfil. We agree that any new functions relating to climate adaptation need to be resourced adequately. The framework must enable local flexibility. We believe local government needs to have a clear ability to take preventative actions, such as clearing river mouths and riverbeds to prevent flood damage.

We note that several important policy workstreams are under way that we believe need to have a strong focus on climate adaptation:

- When arranging regional deals with local government, we believe the Government needs to focus on infrastructure that assists with climate adaptation.
- We believe all infrastructure and planning decisions need to consider climate adaptation.
- We believe the Regional Infrastructure Fund should have a focus on assisting communities to adapt to the effects of climate change.
- The replacement of the Resource Management Act 1991 needs to contain stronger provisions and provide for national direction that prevents development and intensification in risk-prone areas. It should also support, and incentivise where appropriate, climate resilient and decarbonising infrastructure that supports the effective functioning of ecosystems and promotes biodiversity (green infrastructure). Consideration should also be given to interim measures while the replacement for the Resource Management Act is developed.

We also believe there needs to be a single government agency, whether existing or new, that is the lead agency on climate adaptation. The agency needs to be public facing and have the ability to work with other government entities, including local government, as well as iwi/Māori, businesses, communities, infrastructure providers, banks, and insurance providers.

In chapter 2, we recommended that the framework include meaningful performance reporting measures. We consider that the lead agency on climate adaptation should be responsible for reporting on climate adaptation progress and the framework's performance. This would be part of central government's stewardship role. Reporting on the framework's effectiveness is crucial to ensuring that the framework facilitates meaningful progress.

3.4 Recommendations

- We recommend to the Government that there should be a comprehensive national framework set out in legislation that establishes a clear mandate for local and central government, and resourcing and financing arrangements, as it relates to climate adaptation. The framework should establish a system where all actors are incentivised and able to act on climate adaptation.
- We recommend to the Government that all decisions about infrastructure, planning, and development must consider climate adaptation. This includes policy workstreams such as regional deals, the infrastructure pipeline, the Regional Infrastructure Fund, the replacement for the Resource Management Act, and interim planning measures that prevent development and intensification in risk-prone areas.

- We recommend to the Government that there should be a lead agency on climate adaptation that can support an all-of-government approach, partner with iwi/Māori, interact with the public and key stakeholders, and have responsibility for reporting on climate adaptation progress and the framework's performance.

4 Who pays for investment in climate adaptation?

The potential costs associated with climate adaptation are seriously uncertain. A key function of the adaptation framework will be to clarify who should pay for investment in climate adaptation.

4.1 Information from the public

Principles that submitters suggested could guide investment in climate adaptation include:

- the need for proactive investment in risk reduction and resilience
- the need for a clear, enduring, and transparent approach to funding that facilitates effective planning, good decision-making, and long-term certainty
- equity, recognising that the costs of adaptation will be high and may fall unevenly across the population
- affordability and minimising long-term costs—upfront investment will reduce costs in the long term
- prioritising investment that has other benefits, such as emissions reduction, nature conservation, and energy security
- the need for evidenced-based decision-making
- beneficiary pays (those who benefit from investment should contribute to the costs)
- exacerbator pays (those whose activities exacerbate climate change should contribute to the costs of adaptation)
- partnership with iwi/Māori
- flexibility and trust
- improved coordination.

A national climate fund was proposed to address the effects of climate change and ensure the equitable distribution of costs across society and generations. There was support for adaptation funding to cover both planning and implementation.

4.2 Information from the Ministry for the Environment and the Treasury

The current approach

Advisers explained the current approach to investment in risk reduction and improved resilience:

- **Property owners** are responsible for investing in risk reduction and resilience for their own assets. Property owners can include individuals, businesses, not-for-profits, infrastructure and services providers, iwi/Māori, councils, and central government.
- **Banks and other financial institutions** can direct capital towards adaptation activities and demonstrate opportunities, risks, and potential returns on investments. **Insurers** distribute financial risk, provide pay-outs post-disaster to support recovery, and can

incentivise individual policy holders to reduce risk. As risk increases, premiums may become unaffordable, resulting in underinsurance, or insurers may stop providing cover. Underinsurance and insurance retreat pose risks to banking and wider financial markets (as insurance is a condition of a mortgage).

- **Local councils** have the primary responsibility for natural hazard risk management. However, there are no national standards and councils take varying approaches. Councils' levels of service can be determined in consultation with communities. The current system primarily relies on local government investment in protection infrastructure and local infrastructure services, such as flood protection, three waters, and local roads. Local government typically draws on rates and debt to fund and finance infrastructure.
- **Central government** manages the resilience of its own infrastructure through the Investment Management System.[10] Central government does not generally commit to providing others with support for risk reduction. Under the emergency management system, central government contributes to the cost of reinstating and repairing essential infrastructure post-emergency event (60 percent of the cost for non-roading infrastructure, and sometimes a larger contribution for roading assets based on decisions of the New Zealand Transport Agency and usually funded through the National Land Transport Fund).

  While the Investment Management System guides investment in climate resilience for assets owned by the central government, there is no overarching system or framework to guide and co-ordinate investment in risk reduction and climate resilience at the local and regional levels. This reflects existing responsibilities whereby councils have primary responsibility for paying for risk reduction.

Problems with the current approach

Advisers noted that natural hazard risks will significantly increase with climate change. Significant financial costs could potentially be saved by pre-emptively investing in protection and climate-resilient infrastructure and other proactive actions to reduce the risks of natural hazards. This would prevent further damage from more severe and frequent events.

To proactively reduce risks, investment is taking place across New Zealand. However, there are likely gaps in investment in some parts of the country. This underinvestment could create greater long-term costs for households and businesses, affecting livelihoods, councils, and central government.

In extreme circumstances, central government is called upon to act as the insurer of last resort (beyond its normal commitments to share the costs of emergencies), deciding on an ad hoc basis how to meet costs not met by others. The ad hoc and often reactive approach taken to these decisions has led to poor outcomes. These include rushed and inefficient decisions, and reduced incentives for asset owners to proactively reduce their own risks (either individually or collectively such as through targeted rates).

[10] All departments, Crown entities, and Schedule 4A companies are responsible for managing their own assets, including considering whether, and the extent to which, assets are resilient to the effects of climate change. The key requirements and responsibilities for agencies are set out in Cabinet Office circular CO23 (9).

The causes of council underinvestment are contested. Potential causes identified by advisers include:

- overlooking where such investment could have wider benefits to all New Zealand, in particular when people who benefit do not contribute to funding (in this sense, the current system is not a full reflection of a beneficiary-pays system)
- councils bearing only a minority share of post-event costs compared to the Crown, which in theory weakens incentives for councils to invest in pre-event risk mitigation
- political constraints that can lead to councils forgoing critical investment, including resistance to introducing targeted rates, increasing rates, or taking on debt
- varying financial capacity to invest in risk reduction and resilience projects due to different demands on council expenditure, such as levels of exposure to natural hazard risk, council size, levels of income, and rating ability.

To avoid damage and reduce overall costs, well-planned and coordinated investment at scale will be important before disasters occur. New strategies are needed to ensure system actors are incentivised and able to manage risk and invest in risk reduction and resilience, and to minimise long-term costs to the Crown. Flexible strategies will be important to ensure the right actions are taken to deliver the best outcomes.

Scale and cost of the investment needed

The full scale and cost of the investment needed is unknown. However, there are increasing signals that they could be significant and long term:

- New Zealand already has a significant infrastructure deficit. This is estimated to be $52 billion for local government infrastructure. While this estimate includes all infrastructure, (not only infrastructure related to risk reduction) it indicates the funding pressures on councils' balance sheets.
- Regional councils have indicated that they invest around $200 million a year in flood protection and control infrastructure.[11] This figure does not include investment by territorial authorities in risk reduction (such as investment in stormwater drainage systems) or investment in the resilience of local authority assets.
- The total costs of disasters are broader than the insured losses. IAG estimated the true cost of the 2015 Dunedin floods was $138.4 million, compared to the $28.2 million covered by insurance payouts.
- The estimated costs of the preferred adaptation pathways for managing coastal hazards over the next 100 years in the case study of the Clifton to Tangoio coastline are almost $2 billion.[12]

4.3 Information from our independent specialist adviser

Our independent specialist adviser noted that in some cases significant financial costs could also potentially be saved through transformative adaptation (such as managed retreat and sectoral transitions), not just through investing in protection and climate-resilient

[11] Tu Urua Hahika, Before the deluge: Building flood resilience in Aotearoa, December 2022.

[12] Ministry for the Environment and Hawke's Bay Regional Council, Case study: Challenges with implementing the Clifton to Tangoio Coastal Hazards Strategy 2120.

infrastructure. This would require a different investment logic than that applied to investment in resilience-building.

Allocative principles for who pays for the costs of adaptation

Our independent specialist adviser said that the lack of quantitative data on costs, and high levels of uncertainty over present and future costs, is partly a matter of circumstance. He advised us that New Zealand's research funding system has not adequately supported the research that might fill these knowledge gaps; nor has government done enough to learn from past shocks.

However, he also advised us that this uncertainty is inherent to the complex nature of climate adaptation. There will always be limitations to what can be reasonably quantified into the future. This is due to the limits of scientific knowledge on the impacts of climate change, and because it is currently unknown how the international community will respond (for example with emissions reductions, technology uptake, and changes to demand).

We were advised that this uncertainty is why analytical tools (such as scenario analysis) are useful for the formulation of decisions on climate adaptation. Even under conditions of uncertainty and lack of knowledge, decision-makers need to make decisions. To avoid poor decisions, it is important to use tools that are suited to decision-making under conditions of uncertainty, rather than impose a false sense of certainty.

Our independent specialist adviser used scenario analysis to explore the practical implications of the following principles for allocating the costs of adaptation:

Possible principles for allocating the costs of adaptation

Beneficiary pays	• The costs of adaptation should fall on those who benefit directly. • Examples include household and business spending, private debt and equity, rates-based funding, targeted rates, user-pays and cost recovery, and payment for ecosystem services.
Exacerbator pays	• The costs of adaptation should fall on those who exacerbate risks and contribute to maladaptation. • Examples include pricing externalities (e.g. emissions pricing), tort remedies (e.g. compensatory damages), and regulatory compliance costs.
Public pays	• The costs of adaptation should be spread generally across society at the national or regional level. • Examples include tax-based funding, rates based funding, and public debt.
Abilty-to-pay	• The costs of adapatation should vary with ability. More able (wealthier) agents have greater duties to bear costs than less abled. • Examples include targeted support for disadvantaged households or communities, philanthropic grants and donations, impact investing, and progressive taxation.

The following four scenarios (A, B, C, and D) explore the possible outcomes from the most extreme application of a single allocative principle. In isolation of other countervailing

principles, the full allocation of costs onto one sector of society is highly undesirable and likely inconsistent with the adaptation framework's proposed objectives.

The latter three scenarios (E, F, and G) explore how a combination of different principles, with different weightings, could achieve a more balanced approach to allocating costs. However, no combination of principles would be free from trade-offs or political contestation.

Pure beneficiary pays

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario A: The costs of climate change are absorbed where they fall. Local communities are highly sensitive to climate-related risks and this is reflected in how people cautiously manage their assets. Despite this, many of the drivers of climate-related risk, such as maladaptive land use, persist. This is because the costs of maladaptation are borne entirely by third parties, and not at all by those who make maladaptive land use choices. Social cohesion is strained because some communities are subject to very high council rates and extra charges for user-pays adaptation schemes, while the drivers of systemic risks go unmitigated. Further, individual property owners struggle with the transaction costs of collaboration and cannot efficiently implement collective solutions to shared adaptation challenges, such as large-scale infrastructure.

Pure exacerbator pays

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario B: Many businesses face overlapping taxes and pricing mechanisms to mitigate their contribution to climate risk. This includes emissions pricing and congestion charging, but also instruments designed to manage maladaptation, which includes climate risk-adjusted insurance premiums, land-use intensity tax, higher water rates, and more. Increased litigation for nuisance and damages also results in ongoing court costs and reputational damage to companies, even though some cases are malicious or self-serving. Many smaller businesses have not survived the higher costs of production. Nevertheless, many larger businesses, especially multinational organisations, are still not paying the full costs of production due to their greater lobbying power. This resistance in the political economy is reinforced by significant public unrest over the pro-inflationary impacts of higher costs, which businesses pass on to consumers. Consequently, governments are forced to make ad hoc policy exemptions to relieve the political pressure, which results in unequal policy impact, suboptimal pricing and regulatory uncertainty.

Pure public pays

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario C: Central government exercises full sovereign authority, using tax revenue and public debt to implement its preferred climate adaptation plan. This enables the creation and maintenance of large-scale public infrastructure but means little progress on localised adaptation challenges. Centralised decision-making tends to lack local knowledge and legitimacy, often resulting in unintended consequences and community backlash. Further, the promise of publicly funded solutions means that many communities do not prepare or self-insure against climate-related risks, with the large share of time and effort invested into funding applications. Consequently, a disproportionate share of public investment goes to politically influential electorates, at the expense of disadvantaged communities which are often located in areas of higher risk. All this results in adaptation costs that are far greater than they might have been. Trust in government deteriorates over the long run as public expenditure increases, signs of mismanagement proliferate, and local self-determination is undermined.

Pure ability-to-pay

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario D: The duty to pay for adaptation is shifted onto the most wealthy individuals and companies in the country. This is achieved by highly progressive taxes and strong social expectations for philanthropic donations to resilience-enhancing projects. This instils a strong sense of social justice insofar as disadvantaged communities are the primary beneficiaries of investment. However, the national costs of climate adaptation are far greater than the scale of this wealth transfer. Moreover, its overall impact is only incremental, because this approach does not incentivise asset owners to prudently manage their risks, nor disincentivise exacerbators from contributing to maladaptation. Eventually, tax evasion, offshoring, and emigration by wealthy agents deprives this approach of its ability to pay.

Efficient Markets Approach

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario E: Costs are largely borne by those who benefit from adaptation, as well as those who produce climate-related risks. Externalities are priced suboptimally—that is, the full costs of production are not imposed upon businesses. However, costs are significant enough to create incentives to reduce emissions and to reduce activities that exacerbate climate-related risks. Public spending is mobilised only to fix genuine market failures, or to fund public infrastructure that cannot efficiently be provided privately. Social solidarity is limited, and loss-sharing is minimal, except for higher consumer prices as businesses pass along these costs. This results in a deepening of economic inequality and social discontent, which is exacerbated by the increasing frequency and severity of climate-related shocks, as well as the lack of targeted support for low-income communities.

Social Value Approach

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario F: The costs of climate adaptation are spread across local beneficiaries and government. There is a preference for funding adaptation by general rates rather than taxes, but a reluctance to extend the beneficiary-pays approach further to eliminate loss-sharing completely. A progressive tax system is favoured, and there is an aversion to the use of pricing instruments because they can be regressive due to their pro-inflationary impact on consumer prices. Given that funding is constrained, there is a strong commitment to prioritising disadvantaged communities, which serves social justice and redistributive goals. However, this creates dependencies within those communities because risk management becomes intertwined with the decisions of government, which disincentivises stewardship and self-insurance.

Community-Led Adaptation

Beneficiary pays	Exacerbator pays	Public pays	Ability-to-pay

Scenario G: The community-led approach prioritises local autonomy and self-determination, even though this entails greater duties for local communities and iwi to bear the costs of climate adaptation. Community trusts and philanthropic funding plays a significant strategic role, both by providing grants and impact-oriented investment. Public funding is deployed for some public infrastructure, but especially for community-level resourcing and capability-building. This results in some successes where local knowledge is effectively mobilised for local solutions. But it also results in some failures where local communities invest in ineffective or counterproductive adaptation strategies, such as seawalls or stopbanks, which are motivated by sentimentality rather than evidence. Also, communities typically lack the powers to force exacerbators to pay for maladaptation, only exercising weaker influence through the social licence to operate. This means that many of the structural drivers of risk are unmitigated.

4.4 Committee opinion

We recognise that the potential costs of investing in climate adaptation are uncertain, but likely to be significant and long term. We recognise that some of the uncertainty surrounding the potential costs is inherent to the complex nature of climate adaptation. However, we think more could be done to improve the country's collective understanding of the potential costs and identify any gaps in current investment.

We agree with our independent specialist adviser that allocating the full costs of adapting to climate change onto one sector of society is highly undesirable. We believe that investment in climate adaptation should be paid for by applying a combination of the following principles:

- **Beneficiary pays**—Those who directly benefit from investment in climate adaptation should contribute to the costs of adaptation.
- **Exacerbator pays**—Those who exacerbate risks and contribute to maladaptation should contribute to the costs of adaptation.
- **Public pays**—The costs of adaptation should be spread generally across society (either regionally or nationally).
- **Ability-to-pay**—Those with greater ability to contribute to the costs of adaptation should contribute more.

We recognise that the weighting of these principles may change over time, for example as information and data is more readily available.

4.5 Recommendations

- We recommend to the Government that it work with local government, researchers, and the private sector to compile information about what is currently being spent on climate adaptation and improve estimates of the potential future costs of adaptation.
- We recommend to the Government that investment in climate adaptation should be paid for by applying a combination of the following principles: beneficiary pays, exacerbator pays, public pays, and ability-to-pay.

5 How are costs shared for residential property retreat?

Continuing from the previous section of who should pay for investment in climate adaptation, this section explores how costs for residential property retreat could be shared.

5.1 Information from the public

Submitters suggested that the following principles could guide cost-sharing for residential property retreat:

- **equity**—there should be a fair process for deciding how costs are allocated between property owners, local councils, central government, and other parties (we note that there were varying interpretations of equity and fairness)
- **affordability and minimising long-term costs**—we heard concerns about the cost of managed retreat for local government and that affordability should be front and centre
- **distribution of impacts**—many submitters supported public compensation for people who need to retreat from a location because of climate-related events. However, they differed on the types of properties that should be compensated (second homes, holiday homes, businesses)
- **a unique approach for whenua Māori and cultural infrastructure** (refer to chapter 6 of this report for more discussion of this matter).

5.2 Information from the Ministry for the Environment and the Treasury

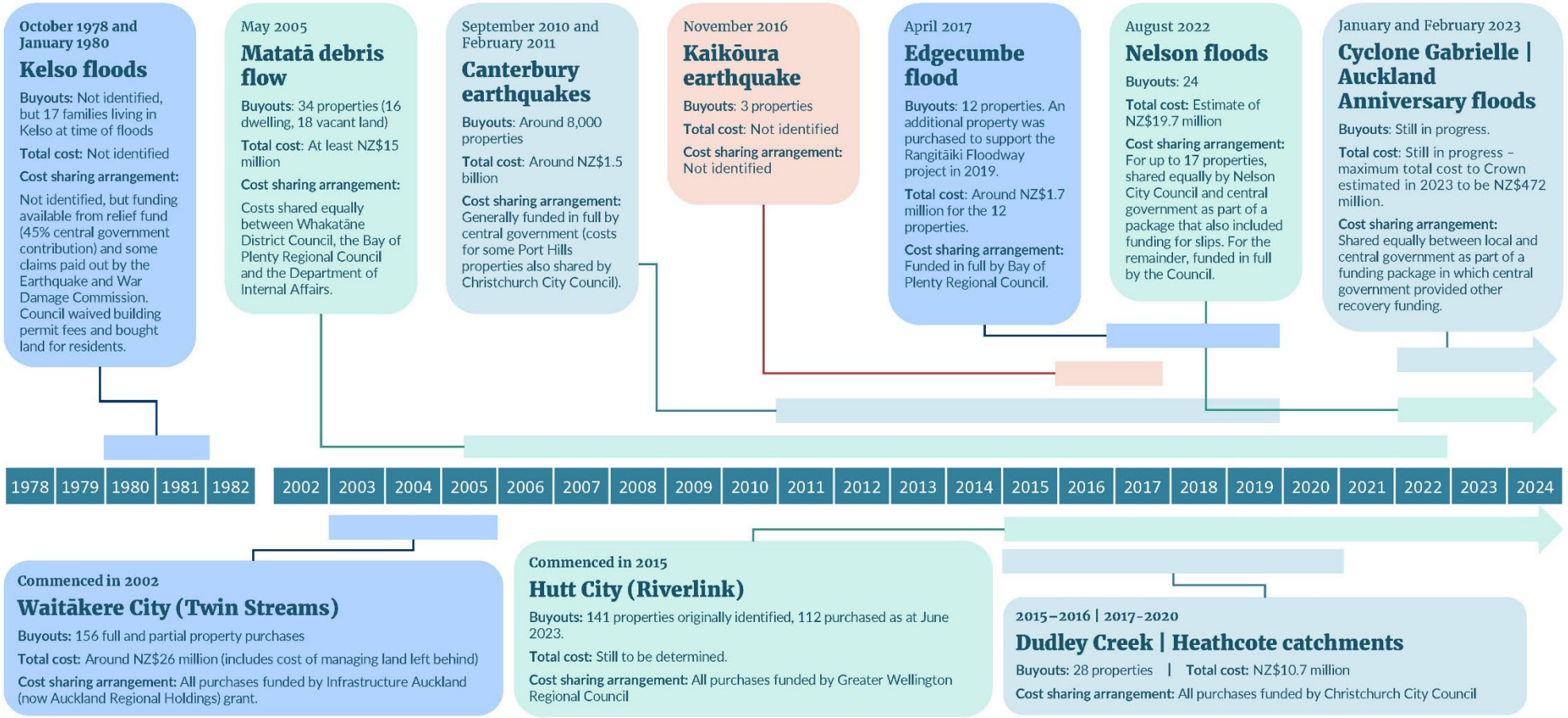
Current approach to residential property retreat

Advisers explained that costs associated with natural hazard and climate change-related damage to residential properties are currently borne mostly by property owners. This is typically through the purchase of insurance. However, in practice, when costs arise that cannot be covered through insurance, local and central government take an inconsistent and generally reactive approach to cost-sharing.

The timeline on the next page sets out cost-sharing arrangements for known residential property buyouts to date.

Most recently, the central government provided 50 percent of buyout and relocation costs for properties severely affected by the Cyclone Gabrielle and Auckland Anniversary floods. The Crown's share totalled about $472 million. The final negotiated package for severely affected locations also included additional central government support for other resilience measures and transport projects. This brought the central government's total contribution to approximately $1.7 billion. This additional portion of central government support is likely to have enabled councils to accept their 50 percent share of the buyout costs.

Previous residential property buyouts in New Zealand



Timespans indicate period from event (or project commencement) to final buyout. Information was verified with relevant organisations where possible but was harder to obtain for historical buyouts. In some instances, information may exist, but an accurate source was not identified in the timeframe for producing this summary.

The problem as currently understood

Advisers explained that in recent years some residential properties have experienced a shift from an acceptable to an intolerable level of natural hazard risk. Property owners may face significant financial hardship when there is no viable or cost-effective way of mitigating this risk. For example, buyout processes to date suggest that insurance does not substantially cover losses across all affected property owners when flooding occurs and a property can no longer be used for its original purpose.

We were advised that the current ad hoc approach to cost-sharing is likely raising expectations that there will routinely be buyouts. This leaves the Crown and councils exposed to potentially unacceptably high fiscal costs over the long term. It also likely disincentivises risk reduction; raises equity issues between individuals, regions, and different generations; and causes rushed and sub-optimal investment decisions immediately after major events. If, or when, insurance is no longer available to certain properties, these consequences will be exacerbated.

Advisers informed us they do not have high-quality evidence to attribute the causes of losses faced by residential property owners. However, they expect that the losses reflect a range of connected regulatory and market failures, as well as unforeseen changes in risk, including:

- some land no longer being suitable for residential use due to increasing risk
- decision-makers not accurately assessing risk due to poor quality information or a lack of incentives to weight risk appropriately
- legal challenge to risk assessments
- an expectation that costs arising after emergency events will be shared by all New Zealanders, creating moral hazard and reducing incentives for property owners to manage risk
- market inefficiencies creating a disconnection between land prices, insurance premiums, and the underlying natural hazard risk
- development in high-risk locations or in a way that increases risk to downstream areas
- particular difficulties in relocating for low-income and vulnerable people in high-risk areas.

We were advised that there is currently only a limited understanding of how many residential properties are exposed to intolerable risk and are no longer suitable for residential use. There is also no consistent definition or understanding as to what constitutes intolerable risk. There is also little information on how much that exposure might increase in the future as climate risks increase and as the number and value of assets increase.

We were advised that much of the existing data on climate-related hazards focuses on a single measure of frequency, such as the number of properties exposed to a 1 in 100-year flood. However, the data seldom covers other measures of frequency and magnitude that might help to indicate where the biggest impacts are likely to be felt most often (a possible example could be the number of properties facing greater than 1.5 metres of inundation at a frequency of 1 in 10 years or less). This information is likely to be needed to inform decisions on when risk becomes intolerable.

To give a broad sense of the scale of possible exposure to risk, it is estimated that New Zealand will experience between 20cm and 30cm of sea-level rise by 2050. In 2019, NIWA estimated that $12.5 billion of buildings (replacement value) are currently exposed to a 1 percent or greater chance of coastal flooding in a given year. It also estimated that 30cm of sea-level rise above present day levels would expose an additional $6 billion worth of buildings (replacement value), 409km of roads, and one airport to coastal flooding.[13] However, being exposed to risk does not automatically mean that the risk is intolerable.

We were advised that the current system is not meeting the objectives that Cabinet has agreed to in principle. For example:

- ad hoc approaches to buyouts following some disasters mean that New Zealanders have to suffer significant losses in living standards before buyouts are considered, with corresponding societal costs. Local and central government also pay higher-than-optimal amounts to buy people out, with growing fiscal risk as the frequency and magnitude of events increases
- there is significant uncertainty about whether and how central government would contribute to buyouts, meaning funding support to property owners is likely to be unpredictable, unprincipled, unfair, and inconsistent (with different rules applying to different events as well as rules differing between regions)
- the likely increasing expectation that the Crown is the insurer of last resort leads to moral hazard, decreasing people's incentive to manage their own risk. After a disaster, government and councils have effectively purchased property that generally has little or no value, which also prevents the efficient functioning of markets (for example, pricing signals).

5.3 Interim findings from project on residential property in flood/inundation zones

We sought data from our advisers about the potential scale of residential property retreat, including possible costs. They provided the interim findings from research commissioned by the Ministry for the Environment to support the development of policy advice on the climate adaptation framework. This research is intended to consider the potential scale of residential property within flood/inundation zones. We include those interim findings as Appendix D.

5.4 Information from the Expert Working Group on Managed Retreat

The following is an excerpt from a report of the Expert Working Group on Managed Retreat, in which the group discusses who should pay for the costs of planned relocation:[14]

[13] NIWA | Ryan Paulik, Scott Stephens, Sanjay Wadhwa, Rob Bell, Ben Popovich, and Ben Robinson, Coastal Flooding Exposure Under Future Sea-level Rise for New Zealand.

[14] Ministry for the Environment, Report of the Expert Working Group on Managed Retreat: A Proposed System for Te Hekenga Rauora/Planned Relocation, August 2023, pp 17-20.

Who pays the costs of planned relocation?

When determining who should pay particular costs relating to managed relocation as between central, regional and territorial government, account should be taken of the following.

- In principle, the funding source should match the level at which decisions are made or responsibility and accountability are located.
- A specific mix of funding sources may be necessary to create the right incentives for all decision-making entities.
- The mix of funding sources will also have equity and fairness implications that should be considered.
- Different sources of funding have different levels of administrative complexity and collection costs associated with them.
- The need to reduce hardship is relevant to cost allocation, given the different resources available to possible funding sources.

In the report, we identify a range of relevant costs and indicate how they should be met.

Compensatory payments for building owners who must relocate

From our perspective, avoiding hardship by structuring funding so as to provide adequate housing to those who must relocate was a key consideration. Based on the outcomes and principles for planned relocation and funding, we did not consider that preserving people's wealth or protecting property owners from the risks of property ownership were legitimate objectives of the funding system.

Government assistance for property owners participating in a planned relocation should distinguish between:

- natural hazard damage for which insurance pay-outs are available and natural hazard damage for which no insurance pay-outs are available
- natural hazard damage to land and natural hazard damage to buildings
- natural hazard damage to different classes of buildings.

In terms of compensatory payments for buildings (assuming no insurance payouts are available), distinctions should be made between:

- owner-occupied homes that are the principal places of residence for their owners
- rental properties that are the principal places of residence for their tenants (residential rental properties)
- commercial buildings
- second homes (including baches and holiday homes which are not principal places of residence)
- buildings owned by not-for-profit organisations
- buildings of iwi, hapū and Māori communities.

We recommend that compensatory payments be calculated as set out below.

Owner-occupied homes

For buildings, owners of principal places of residence would receive compensatory payments based on the basis of either:

- the rateable value (RV) of their houses, with a cap fixed in a way that would mean that 80 per cent to 90 per cent of homeowners would receive the full RV for their homes
- a sum calculated on the basis of the 'per square metre' cost of building a standard new home of the same size as that being left, subject to a maximum size cap (for example, 180 square metres).

The choice between these two options lies with government.

For land, owners would receive compensatory payments for the same land as is covered under current public natural hazard insurance – namely, for the land under the house and any outbuildings, and for eight metres round the perimeter of the house and any outbuildings. The amount of the payment would be fixed as a proportion of the RV for that land or by reference to the minimum lot size for a residence under local planning requirements, whichever is the greater.

Residential rental properties

Owners of rental properties which provide permanent places of residence for their tenants would receive compensatory payments similar to, but less generous than, those applicable to owner-occupied homes. But owners would receive the payments only on condition that they use the funds to establish long-term rental facilities in the new location, either themselves or by investing in an approved investment vehicle for long-term rental accommodation.

Commercial buildings

Owners of commercial buildings could be eligible for compensatory payments on the following bases:

- Eligibility would be based on hardship, which would be assessed by means testing.
- Any payment would be subject to a condition that it must be used to re-establish new commercial premises in the new location if there was a community-wide planned relocation, or elsewhere if there was not.
- The amount of the compensatory payment would be less than that provided to homeowners (eg, it could be 50 per cent of the RV of the building). There would also be some compensatory payment in relation to land.

Second homes

Second homes such as baches and other holiday homes that are not principal places of residence would receive no compensatory payments, but could receive assistance for removal, demolition and clean-up costs.

Not-for-profit organisations

As was the case after the Canterbury earthquakes, buildings owned by not-for-profit organisations and used for the purposes of their not-for-profit activities should receive

compensatory payments equal to the full RV of their buildings. In relation to land, they should also receive the full RV, although land swaps should also be an option.

Buildings of iwi, hapū and Māori communities

In relation to iwi, hapū and Māori communities, a 'full compensation' approach should be adopted, as applies to not-for-profit organisations. There should, however, be greater emphasis on the Crown making safer land available, providing assistance to move buildings and structures of cultural significance to safer locations, and ensuring that cultural connections to the land being moved from can be retained.

Paying for planned relocation

There is an issue as to how planned relocation should be paid for – through a special levy? Through a dedicated fund built up by a special levy and/or periodic contributions from general tax revenue? Or just through general tax revenue (supported by any necessary borrowing) whenever required?

We do not make a firm recommendation on this issue, but rather set out relevant arguments. It is important, though, that whatever mechanism is chosen, funding for planned relocation should not be subject to the usual vicissitudes of the annual budget round. That will too easily result in deferment and to dangerous delay.

5.5 Committee opinion

We recognise that people often have deeply held ties to where they live and their local community. It is understandable that residential property retreat can be an uncomfortable prospect. However, in some cases residential property retreat will be necessary, and also an opportunity to build stronger and more resilient communities.

The climate adaptation framework needs to enable people to plan ahead. It needs to incentivise risk reduction. There needs to be a consistent approach to cost-sharing for residential property retreat that does not leave the Crown and councils exposed to potentially unacceptably high fiscal costs as the frequency and magnitude of events increases.

Residential retreat must proceed with an understanding and recognition of the historical context of the Crown–Māori relationship, including land displacement and dispossession.

We broadly agree with the general principles expressed by the Expert Working Group on Managed Retreat in the above excerpt (Section 5.4). We have not formed an opinion on the Group's specific proposals for how any potential compensatory payments could be calculated or the circumstances in which they could be available. These detailed proposals should be worked through by the Government as it further progresses the adaptation framework.

We agree with the Expert Working Group that: "avoiding hardship by structuring funding so as to provide adequate housing to those who must relocate was a key consideration. Based on the outcomes and principles for planned relocation and funding, we did not consider that preserving people's wealth or protecting property owners from the risks of property ownership were legitimate objectives of the funding system."

We also agree that any government assistance for property owners should distinguish between:

- situations where insurance pay-outs are and are not available
- damage to land and damage to buildings
- damage to different classes of buildings, including principal places of residence, residential rental properties, commercial buildings, second homes, buildings owned by not-for-profit organisations, and buildings of iwi, hapū, and Māori communities.

We believe any policy work on planned relocation must consider what happens to renters, and what support is made available to them. Policy work should also include investigating proactive financing instruments to help meet the costs of relocation.

We also believe that the Government should undertake further work to identify what amendments to legislation and regulations would be required to enable residential property retreat. We note the example given by a submitter about the current legislative requirements for the withdrawal of electricity services.

5.6 Recommendations

- We recommend to the Government that a key consideration of the adaptation framework should be to ensure there is adequate housing for people who need to relocate, including those who do not own their own property.
- We recommend to the Government that it consider the Expert Working Group on Managed Retreat's recommendations regarding the Government's role in planned relocation.
- We recommend to the Government that it consider the Expert Working Group on Managed Retreat's statement that: "avoiding hardship by structuring funding so as to provide adequate housing to those who must relocate was a key consideration. Based on the outcomes and principles for planned relocation and funding, we did not consider that preserving people's wealth or protecting property owners from the risks of property ownership were legitimate objectives of the funding system."
- We recommend to the Government that any policy work it undertakes regarding residential property retreat or managed relocation include a focus on affected renters and people who do not own property.
- We recommend to the Government that it investigate the idea of proactive financing instruments, working alongside banks and insurance companies to do so.
- We recommend to the Government that it undertake further work to identify what amendments to legislation and regulations would be required to enable residential property retreat.

6 Kaupapa Māori

We have discussed te Tiriti o Waitangi | the Treaty of Waitangi in chapter 2 of this report. This section deals with other matters that did not readily align with previous chapters.

6.1 Information from the public

Bespoke arrangements for whenua Māori—Submitters suggested that bespoke options for Māori land could consider the loss of marae, multiple landholdings, and the different models of Māori land ownership, to ensure cost sharing is fit for purpose for Māori. Submitters also noted that cost-sharing arrangements could include considerations for Treaty redress land that is now subject to the impacts of climate change.

Māori Affairs Committee report—The Māori Affairs Committee's report on Māori climate adaptation recommended (among other things) that funding policies and frameworks for adaptation should give effect to te Tiriti o Waitangi | the Treaty of Waitangi and compensate Māori fairly for any loss of land or culturally important sites. (See Appendix C.)

Heightened risk of climate-exacerbated disasters—Submissions noted that indigenous and other vulnerable communities are at heightened risk of climate-exacerbated disasters. Marae and a range of other valuable cultural assets are at risk from climate change including urupā, mahinga kai, and places of historical significance.

Upholding the rights and interests of Māori—Submitters said the adaptation framework should be developed through a Tiriti o Waitangi lens, to ensure that the rights and interests of Māori are upheld.

Mātauranga Māori—Submitters suggested that a local mātauranga-based framework could be included in the methodology for risk assessments. However, submissions also noted that mātauranga is unique to each iwi and hapū, so a holistic and localised approach would be required for mātauranga-based frameworks.

Mātauranga as a taonga—Māori may regard some data as taonga. It would need to be respected and used appropriately in a manner that considers data sovereignty.

Generational knowledge—Submitters noted that several Māori communities have already been using mātauranga for years, especially those located in coastal or low-lying areas. The intergenerational nature of mātauranga and tikanga could provide a blueprint for how to mitigate and adapt to environmental changes.

6.2 Information from the Ministry for the Environment

Our Ministry for the Environment advisers noted some considerations under Te Ture Whenua Māori Act 1993, the Marine and Coastal Area (Takutai Moana) Act 2011, and Treaty and settlement obligations that are relevant to climate adaptation:

- Te Ture Whenua Māori Act contains limitations and protections on the use, administration, and alienation of Māori land.
- Variation in ownership structures and the number of owners for single blocks of land present challenges for decision-making.
- In the future, government will likely be asked to consider the impacts of climate change on Treaty settlement land and customary rights provided for under the Takutai Moana Act. This could result in providing for or amending specific redress across both processes.
- Precedent has been set through case law for a generous view of the principles of the Treaty and inclusion of tikanga in decisions involving the interpretation and application of New Zealand law.

Ministry for the Environment advisers also brought an example of a tailored approach to cost-sharing with Māori to our attention: the Kaupapa Māori pathway that was recently developed in response to the North Island severe weather events.

The key features of the pathway were:

- Crown-led implementation by the Cyclone Recovery Unit
- a focus on supporting residents on category three Māori land,[15] with some case-by-case consideration of category three general title properties (other land categories were not included, except for Māori cultural assets that were severely impacted)
- inclusion of Māori cultural assets that were affected (marae reservations, buildings, and urupā)
- no cost-sharing contribution was sought from councils
- while there was no requirement for land buyout, there was agreement that there would be no further or future residential use
- the flexibility to explore actively led, clearly mandated, and viable community-based solutions
- owners of Māori land may choose this pathway or the general approach.

The Kaupapa Māori pathway was developed to:

- recognise the Crown's longstanding acknowledgement of Māori land alienation and broader Treaty duties regarding taonga and their protection
- recognise the distinct statutory requirements governing Māori freehold land, governance, and decision-making
- manage broader relationships and interests with iwi, including post-settlement governance entities.

6.3 Committee opinion

We agree with submitters that there should be bespoke arrangements for whenua Māori that consider loss of marae, multiple landholdings, and the different models of Māori land ownership. We also agree that mātauranga Māori has a role to play in climate adaptation

[15] These are properties assessed as not safe to live in because of the unacceptable risk of future flooding and loss of life.

and should be recognised alongside other knowledge systems. Opposition members believe mātauranga Māori should also be provided for.

For example, mātauranga Māori helped to inform the community discussion on rebuilding or relocating in Matatā, a rural coastal community in the Bay of Plenty with a small population. In May 2005, debris flows and flooding from extreme rainfall cut transport links and led to the loss of 27 homes. Mātauranga Māori also informed the location of the marae, which was vital infrastructure in the emergency response.[16]

6.4 Recommendations

- We recommend to the Government that the climate adaptation framework should involve bespoke arrangements for whenua Māori, recognising the different models of land ownership and the effects of climate change on that land.
- We recommend to the Government that the climate adaptation framework should recognise a role for mātauranga Māori alongside other knowledge systems.

[16] Eos | Kate Evans, The River's Lizard Tail: Braiding Indigenous Knowledges with Geomorphology, 14 September 2020.

7 Data and information

A recurring theme throughout this inquiry has been access to data and information about natural hazards and climate risk. This data and information are needed to inform risk assessments and decision-making by different actors for different purposes. The data is mainly generated by local and regional government, as well as by Crown Research Institutes and central-government-funded initiatives.

7.1 Information from the public

Submitters told us about the variability of data on climate risk. We were told that data on climate hazards has been procured using a variety of methodologies and scenarios, and this has caused confusion around levels of risk, risk tolerance, and ownership of the responsibility for managing risk.

Local government and research organisations noted problems of data availability and the challenge of working with data that may be inadequate. Several submitters said that people are prevented from accessing data by expensive paywalls.

Many submitters concluded that access to good, consistent information is critical to ensuring that people know and understand the future risks, costs, and impacts of climate change. For example, good data would ensure that:

- adaptation plans are reliable
- decision-makers can access and use the information they need
- local authorities can appropriately categorise high, medium, and low-risk natural hazards, to avoid subjectivity and produce more equitable outcomes.

Submissions also covered the following topics:

Where more data is needed—Submitters told us more data is needed, or the existing data could be made more useful, about climate and sea-level rise projections, local observational data including mātauranga Māori, and the economic effects of climate change.

Data accessibility—Some submitters wanted more consistent data, and more data sharing. They proposed that all hazard and risk information be kept in a single, easily accessible location.

Risk assessments—Submitters said more consistent risk assessment is needed. This would support better identification of vulnerable areas and help communities prioritise their adaptation efforts.

Information sharing and collaboration needs—Submitters raised the importance of collaboration and information sharing by groups to support transparent decision-making and foster public understanding and trust.

Human resource needs—Several submissions from local government organisations said more professionals with climate adaptation skills and experience are needed.

Communication and education—Submitters said information on risk and climate adaptation should be accessible and easy to understand. Submitters also noted the importance of education.

7.2 Information from the Ministry for the Environment and the Treasury

Advisers noted that unreliable and poor-quality data and information about natural hazard risks can contribute to inefficient markets and ultimately increase the fiscal risk to the Crown. They said there are consistent calls from different groups, sectors, and institutions for improvements to be made to the system that holds natural hazard risk data and information.

Advisers told us that the different challenges faced by various sectors and groups appear to be rooted in common systemic problems. These issues relate to the adequacy, quality, and accessibility of the data and information needed to help people understand and manage risk. Without addressing these systemic issues, market inefficiencies are expected to worsen as climate change progresses.

Advisers identified three key issues:

1) Duplication and variability of data

A key issue across the system is inefficiency and duplication across local government and between the private and public sectors. Similar investments in modelling are replicated for different purposes. Furthermore, the natural hazard data that underpins risk assessments and models is often variable in quality, type, and accessibility. This causes issues with the robustness of risk assessment and can ultimately lead to poorly informed risk management.

2) A lack of data and information

Another system-wide issue is a lack of data and information about the consequences or impacts of natural hazards. For example, there is a general lack of hazard data, including about the depth of inundation and flow velocity used to estimate the consequences of flooding in many locations. Where only flood-extent mapping is available, the number of assets that would be exposed to floods of different likelihoods can be estimated (for example, a 1-in-100-year flood) but the potential for damage to those assets or danger to people cannot necessarily be estimated.

Additionally, there is often insufficient data on how the likelihood and consequences of a natural hazard might change over time due to climate change.

3) The science, innovation, and technology system

The functioning of the wider science, innovation, and technology system affects the natural hazard data system. Central and local governments rely on Crown Research Institutes as key funders, producers, and owners of data. However, Crown Research Institutes often need to recover their costs to fund ongoing data maintenance, storage, or improvements. This frequently means that people who access data from Crown Research Institutes often need to purchase the data multiple times, creating a financial barrier.

Advisers informed us that many stakeholders regard the lack of robust natural hazard risk data and information as a significant barrier to informed decision-making. We were advised

that there is strong support for greater aggregation and integration of data through standardised hazard identification, data collection and storing methods, universally accessible platforms or portals, and a willingness to share available information.

Special topic: Estimating the scale of the total asset base at risk from climate change

Accurately estimating the scale of the total asset base that is at risk is challenging. There is no centrally held information to directly estimate the size of the total risks to all New Zealand assets, or those of the Crown specifically.

Estimating the total assets at risk from climate-related disasters would involve understanding the following matters, for which only partial information is available:

The values of assets—While central and local government hold assets of significant value, most real assets are held by households and firms. Stats NZ estimates that households hold over $1,200 billion in non-financial assets, corporate business enterprises more than $700 billion, and non-corporate business enterprises more than $600 billion. Combined, central and local government hold assets of roughly $300 billion.

It is important to note that the replacement value of assets that are a significant way through their useful life will be significantly higher than their carrying value described above.

Exposure of assets to disasters—Not all assets will be exposed to climate-related disasters. A few studies give a sense of New Zealand's exposure to some climate-related disasters. However, they tend to be incomplete in that they only explore exposure to single hazards and do not explore vulnerability. One study modelled that 441,384 residential buildings with an estimated total replacement value of $218 billion were exposed to flood hazards.[17]

Vulnerability of exposed assets to disasters—Not all assets that are exposed to climate-related disasters will be substantively affected. Vulnerability refers to the impact a hazard has on an exposed asset, individual, or community.

Some studies have explored the vulnerability of infrastructure exposed to flooding. According to the National Infrastructure Vulnerability Assessment 2023, these studies have not identified any critical national infrastructure vulnerable to floods.[18] Advisers were not aware of other nationwide studies of vulnerability of exposed assets in New Zealand.

The frequency and magnitude of disasters—There are many sources for measuring and modelling the frequency and magnitude of disasters. Flood maps, drought scenarios, and other information on climate-related disasters are generated by different entities, stored in different places, and variably available.

[17] Ryan Paulik, Conrad Zorn, Liam Wotherspoon, and James Sturman, Modelling national residential building exposure to flooding hazards, August 2023.

[18] New Zealand Lifelines Council, Aotearoa New Zealand's Critical Infrastructure: A National Vulnerability Assessment Part C: Infrastructure Sectors and Hazards Assessment, 2023, p C-110.

7.3 Information from our independent specialist adviser

Data governance and data commons

Our independent specialist adviser wrote that improving the natural hazard information system will be a complex undertaking and will involve high-level questions of data governance. Data governance involves setting standards that apply to how data is gathered, stored, processed, and disposed of. This is critical for addressing barriers to sharing data, the lack of consistency and interoperability of data, undefined roles and responsibilities, and indigenous data sovereignty. We were advised that, if successful, data governance can unlock the value of the data by enabling experts and innovators to analyse big data sets and convert them into actionable and relevant information.

Our independent specialist adviser said a data commons is likely to liberate data to the greatest possible extent and best address the market failure of incomplete information. A data commons can be defined as "a cloud-based software platform with a governance structure that allows a community to manage, analyse and share its data."[19]

We were advised that there is a significant literature on the governance of data commons, as well as various domestic and international initiatives New Zealand could draw inspiration from. For example, the Open Future Foundation recommends a framework for data commons that includes:

- clearly defined public-interest criteria for sharing data held by private bodies (and other data holders)
- data governance mechanisms that include both open data and other data governance mechanisms based on gated access to enable payments for data usage
- a stewardship body that serves as a trusted party responsible for ensuring data availability and acting as a gatekeeper for the data commons.[20]

Our independent specialist adviser noted that work is already underway in New Zealand that could serve as a starting point for a data commons for climate adaptation data. This includes the New Zealand Data Commons Blueprint, work on open banking, and the National Data Infrastructure proposal from the Science for Technological Innovation National Science Challenge.[21]

7.4 Committee opinion

We recognise that having data and information is essential to being able to successfully adapt to climate change. Decision-makers, whether they are the Government setting national policy or a couple deciding where to purchase a house, need data and information in order to make good decisions. We recognise the need to improve the system for producing and sharing data and to increase the level of data that is available. Data and information about natural hazards and climate risk should use consistent standards and be

[19] Robert L. Grossman, Ten lessons for data sharing with a data commons, 6 March 2023.

[20] Open Future Foundation, Public Data Commons as a Policy Framework for the Data Impact Hub and the Mutual Commitment Framework, 7 November 2023.

[21] George Sadlier, Doug Dixon, Markus Luczak-Roesch, Matthias Galster, and David Eyers, National Data Infrastructure - Blueprint for Aotearoa New Zealand, July 2024.

readily accessible to the public from a database. Local authorities and other users should be able to contribute and share their data.

7.5 Recommendations

- We recommend to the Government that it develop an accessible public data commons for data on natural hazard and climate risk, with the aim of improving the data's quality, consistency, and availability.
- We recommend to the Government that it prioritise funding research that seeks to improve the data on natural hazard and climate risk.

Appendix A—Committee procedure

Committee procedure

The inquiry was referred to our committee by the House on 9 May 2024. We met between 22 May and 30 September 2024 to consider the inquiry.

On 23 May 2024, we called for public submissions with a closing date of 16 June 2024. We received approximately 350 unique written submissions and approximately 760 form-based submissions. We heard from 82 submitters at hearings held in Wellington and by videoconference in July and August 2024.

We received advice from the Ministry for the Environment and the Treasury. Dr David Hall served as our independent specialist adviser. The Parliamentary Commissioner for the Environment also served as an adviser until 23 July 2024.

Committee members

Stuart Smith (Chairperson)
Jamie Arbuckle
Hon Barbara Edmonds
Ryan Hamilton
Nancy Lu
Hon Dr Deborah Russell
Todd Stephenson
Chlöe Swarbrick
Rawiri Waititi
Catherine Wedd
Hon Dr Megan Woods

Debbie Ngarewa-Packer participated in this inquiry.

Related resources

The documents we received as advice and evidence for this inquiry are available on the Parliament website, along with recordings of our hearings:

- 16 July 2024 (video 1, video 2, video 3, video 4, video 5, video 6, video 7)
- 29 July 2024 (video 1, video 2)
- 31 July 2024 (video 1)
- 28 August 2024 (video 1)

Appendix B—Terms of reference and questions for submitters

We opened for submissions on 23 May 2024. We amended the call for submissions on 29 May 2024 to add the list of questions for submitters.

Public submissions are now being called for on the Finance and Expenditure Committee's inquiry into climate adaptation.

The closing date for submissions is 11.59pm on Sunday, 16 June 2024.

The inquiry has the following terms of reference:

(1) The purpose of the inquiry is to develop and recommend high-level objectives and principles for the design of a climate change adaptation model for New Zealand, to support the development of policy and legislation to address climate adaptation.

(2) For this purpose, the committee must consider the following topics:

  (a) the nature of the climate adaptation problem New Zealand faces

  (b) frameworks for investment and cost-sharing

  (c) roles and responsibilities

  (d) climate risk and response information-sharing.

(3) The committee may, as it thinks fit, consider other matters relevant to the purpose of the inquiry.

(4) The committee must take account of submissions received by the Environment Committee on its recent inquiry into climate adaptation.

(5) The committee must finally report on the inquiry by 5 September 2024.

The written submissions received by the Environment Committee for their inquiry into climate adaptation will be considered by the Finance and Expenditure Committee. These submitters are welcome to make a supplementary submission with any new information they wish to share, but do not need to repeat what was in their original submission.

The Finance and Expenditure Committee has published online a document that summarises the submissions made on the Environment Committee's inquiry. This document is informing the committee's consideration.

The committee invites any new submissions to consider the following questions:

- What would be a durable, affordable, and fair approach to adaptation for the existing built environment (i.e., where people live and work) in the future? How could that approach be phased in over time?

- What outcomes should such an approach to adaptation lead to? What are the highest priorities to achieve?
- What do you think the costs will be? How should these various costs be distributed (eg amongst property owners, widely across New Zealanders, ratepayers, now and in future)? Should this distribution change over time?
- What do you think is the critical information that will inform people and help them understand future risks, costs, and impacts?
- What are the particular issues facing Māori, especially sites, assets, and land vulnerable to climate-driven natural hazards?
- What are the problems with New Zealand's approach to managing climate-related natural hazards? What are the underlying drivers of these problems?
- What adaptation-related costs are you facing now? How are you planning on addressing these costs?
- What adaptation related risks are you facing now and how are you planning to address these risks?

The committee notes that if legislation arises from this inquiry, there likely will be a further opportunity for public submissions on that legislation.

Appendix C—Māori Affairs Committee's recommended principles

The following is an excerpt from the report of the Māori Affairs Committee of the 53rd Parliament on its briefing on Māori climate adaptation.[22] *The committee recommended that the Government take into account the following principles when developing and implementing law and policy relating to climate change adaptation:*

Adaptation planning processes should:

1. give effect to Te Tiriti o Waitangi–the Treaty of Waitangi
2. inform Māori about the risks to their whenua, now and over time, with good data and information
3. recognise the value of mātauranga Māori equally alongside other knowledge systems
4. recognise and respect culture and identity, values, and practices of local communities
5. acknowledge and protect Māori rights and interests
6. enable negotiation where settlement land is lost
7. conserve, protect, and develop taonga, papakāinga, marae, urupā, and other significant sites
8. enable both the Crown and Māori to deliver on their respective roles and responsibilities
9. ensure local government also upholds Te Tiriti o Waitangi–the Treaty of Waitangi
10. encourage the sharing of best practice, data, and case studies among Māori communities.

Adaptation engagement processes should:

11. give effect to Te Tiriti o Waitangi–the Treaty of Waitangi
12. enable robust and deep conversations to be had between Māori communities, the Crown, and local government
13. enable local community leadership
14. enable joint, shared, or preferably delegated decision-making to Māori
15. foster positive, collaborative working relationships and co-creation between all parties
16. enable the inclusion of different communities of interest (for example, mātāwaka)
17. engage with the correct groups who are responsible for making decisions about the whenua in question (for example, Māori land trusts).

Adaptation funding policies and frameworks should:

18. give effect to Te Tiriti o Waitangi–the Treaty of Waitangi
19. compensate Māori fairly for any loss of land or culturally important sites
20. fund mātauranga Māori research
21. fund Māori to participate in adaptation plan development processes led by others or to develop their own adaptation plans
22. fund the implementation of Māori adaptation plans, including mātauranga Māori solutions.

[22] Māori Affairs Committee, Final report (Briefing on Māori climate adaptation), 5 July 2023.

Appendix D—Research on residential property in flood/inundation zones

We attach the interim findings from research commissioned by the Ministry for the Environment to support the development of policy advice on the climate adaptation framework. The interim findings relate to the potential scope of residential property in flood/inundation zones.

Project on potential scale of residential property within flood/inundation zones - interim findings

These are interim findings produced specifically at the request of the Finance and Expenditure Committee to support the committee's inquiry into adaptation.

PROJECT DESCRIPTION

This project will estimate the financial cost of retaining the practice of ad hoc buyouts for residential property following extreme weather events over the next 35 years. Using existing data sources, this analysis will estimate annual expected losses for properties in existing coastal inundation, fluvial (riverine) and pluvial flood zones as these extreme weather events become more severe and frequent under climate change. To establish an aggregated financial projection, the work will focus on residential properties that are likely to experience significant and/or repeated losses by 2060. The interim findings of Canterbury case study estimate the total valuation (land & buildings) of all residential properties in flood/inundation zones that are expected to be damaged by one extreme flooding/inundation event. The final report will include estimates at national and regional levels, but not at a level that would enable any person to identify consequences for an individual property.

ASSUMPTIONS

- These numbers take account of existing and planned risk reduction measures to some extent, but they do not fully factor those measures in due to data limitations.
- This analysis is based solely on the RCP 4.5 scenario.
- For this project, we assumed a typical ground floor height between 0.4-0.6 metres above ground level in flood zones and coastal inundation zones, informed by local building codes.
- With "one extreme flooding/inundation event" we refer to the probability of an event occurring once within a 35 year period where the annual probability is increasing with climate change

FINDINGS

- Coastal properties in inundation zones are experiencing the fastest rate of change due to sea-level rise.
- The rate of change for fluvial (and pluvial) residential properties is significantly lower than for properties in coastal inundation zones.
- Modelling results for residential properties are highly sensitive to floor height. For example, raising the floor height by 50 cm would significantly reduce expected losses. This would not account for accessibility issues such as flooded evacuation routes.
- Under higher RCP scenarios, residential properties in flood/inundation zones that are expected to be damaged by one extreme flooding or inundation event, are projected to experience that damage earlier in time compared to lower RCP scenarios.

The numbers below take account of existing and planned risk reduction measures to some extent, but they do not fully factor those measures in due to data limitations. The analysis is further constrained by the availability and quality of other data.

NATIONAL

Estimated number of residential properties currently in flood/inundation zones	Estimated valuation (land & buildings) of all residential properties in flood/inundation zones
227,000 (total)	**$195 Billion (total)**
25,000 (coastal) 202,000 (fluvial & pluvial)	$17 Billion (coastal) $178 Billion (fluvial & pluvial)

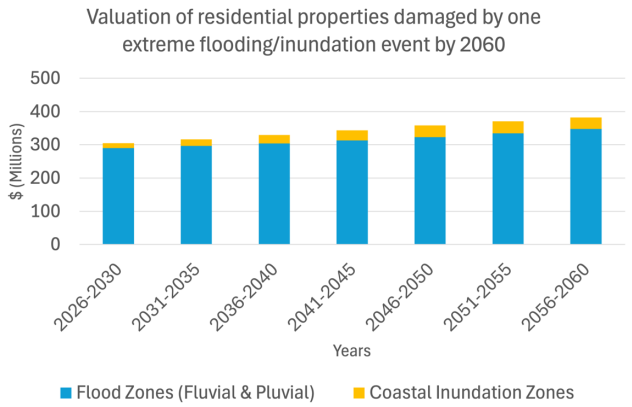
The national numbers presented here exclude the Waikato region. Results for Waikato were not available for the interim findings but will likely be available for the final report. The national numbers do not include the total valuation (land & buildings) of all residential properties in flood/inundation zones that are expected to be damaged by one extreme flooding/inundation event. These numbers will, however, be included in the final report.

CANTERBURY CASE STUDY

Estimated number of residential properties currently in flood/inundation zones	Estimated valuation (land & buildings) of all residential properties in flood/inundation zones
52,000 (total)	**$39 Billion (total)**
6,000 (coastal) 46,000 (fluvial & pluvial)	$4 Billion (coastal) $35 Billion (fluvial & pluvial)

EXAMPLE OUTPUT

Distribution of total valuation of properties in the flood/inundation zone that are expected to be damaged by one extreme flooding/inundation event (assuming 40cm floor height)



The total valuation (land & buildings) of all residential properties in flood/inundation zones that are expected to be damaged by one extreme flooding/inundation event

$100-300 Million (coastal)

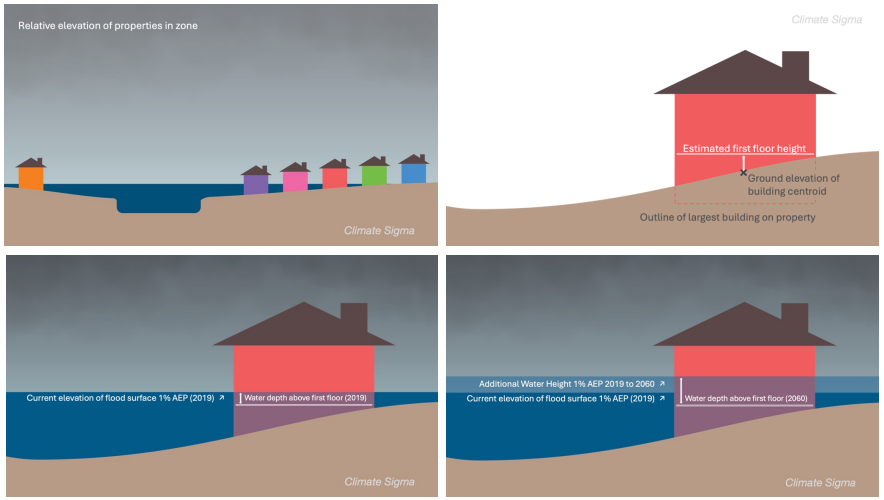
$1-3 Billion (fluvial & pluvial)

In the five years from 2026 to 2030, the total valuation (land & buildings) of all residential properties in flood/inundation zones that are expected to be damaged by one extreme flooding/inundation event is $305 million. In the five years from 2030 to 2035, an additional $316 million will be exposed.

After 2060, we start to see fewer additional properties exposed. This is because most properties in a flood or inundation zone will already have been exposed to an extreme event, and therefore have been accounted for in earlier years.

METHOD

For coastal residential properties, the insurance retreat methodology developed in 2020 (Storey et al., 2024) will be applied to estimate expected losses from coastal inundation between 2025 and 2060. For fluvial (& pluvial) residential properties, the methodology developed for RBNZ (Adams-Kane et al., 2024) will be applied to estimate expected losses for properties in fluvial (riverine) and pluvial flood plains between 2025 and 2060.



DATA LIMITATIONS

- The project does not include residential properties outside the 1:100 ARI horizontal boundaries due to limited data availability, with comprehensive data only accessible for a few regions.
- Dataset B, used for fluvial (and pluvial) analysis, does not employ a national methodology and integrates data from various sources with different ARI periods. Additionally, this interim analysis has relied on Dataset B to produce national findings, but Dataset B is now partially out of date. The final report will also incorporate updated council maps made available within the project's timeframe.
- Both Dataset A1 and most of Dataset B are two-dimensional datasets that lack elevation data, so this project has needed to estimate the water depth at each property within the flood/inundation zones. The Digital Elevation Model (DEM) used to create these maps was not available. Without the DEM, evaluating flood/inundation risk relative to building elevation is compromised, leading to potential errors in the analysis.
- The project does not include analysis of stormwater infrastructure, flood defences (such as stopbanks), water velocity, and duration of inundation due to the absence of a publicly available national-scale hydrodynamic model. The New Zealand Inventory of Stopbanks is not publicly available.
- Landslide risk is not included in the project. Landslide risk modelling is being undertaken through various research programs. Annualised losses related to landslides are estimated at approximately $250 to $300 million (Rosser et al., 2017).

Dataset ##	Name	Host	Approx. year
Dataset A	Coastal Flood Layer	NIWA	2023
Dataset B	Pluvial and Fluvial Flood Layer	NIWA	2019
Dataset C	HIRDS Rainfall Layer	NIWA	2017
Dataset D	Lidar Digital Elevation Models	LINZ	2017-2024
Dataset E	Flood Fragility Functions (Figure 1, page 7)	NZCCRI, Victoria University of Wellington	2010
Dataset F	NZ Building Outlines	LINZ	2024
Dataset G	Building Information https://data.linz.govt.nz/table/105617-nz-properties-building-age/ https://data.linz.govt.nz/table/101291-nz-building-outlines-lifecycle/	LINZ	2023-2024
Dataset H	Asset Valuations	Quotable Values	2021-2023
Dataset X	Figure 7 page 36) in: Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition	NIWA	2018

DATA AVAILABILITY

This work was commissioned by the Ministry for the Environment to support the development of policy advice on the adaptation framework announced by the Minister of Climate Change. The intent was to use the best publicly available data in New Zealand. Some of the data licences for publicly available data prohibited any commercial use. This meant this data could not be used for the provision of professional services to the Ministry for the Environment for this project.

REFERENCES

Adams-Kane, J., Nicholls, K., & West, T. (2024). 2023 Climate Stress Test results Bulletin [Appendix I]. *RBNZ*.

Rosser, B., Dellow, S., Haubrock, S., & Glassey, P. (2017). New Zealand's National Landslide Database. *Landslides*, 14(6), 1949–1959. https://doi.org/10.1007/s10346-017-0843-6

Storey, B., Owen, S., Zammit, C., & Noy, I. (2024). Insurance retreat in residential properties from future sea level rise in Aotearoa New Zealand. *Climatic Change* 177, 44. https://doi.org/10.1007/s10584-024-03699-1