Natural Hazards Commission
Toka Tū Ake

As of 1 July 2024, our name changed from the Earthquake Commission to the Natural Hazards Commission Toka Tū Ake. Find out more about our organisation and insurance scheme on www.naturalhazards.govt.nz.

Research Investment Priorities Statement 2025

A guide to Natural Hazards Commission's research investment

Natural Hazards Commission Toka Tū Ake has a role in research and education as a part of its function under the Natural Hazards Insurance Act 2023:

“To facilitate research and education, and to contribute to the sharing of information, knowledge, and expertise.”

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Statement intentions

This Research Investment Priorities Statement is designed to help applicants align their proposals with Natural Hazard Commission Toka Tū Ake's (NHC Toka Tū Ake) areas of interest. The statement describes the natural hazard and risk research areas we want to target with our research investment to progress our strategic goals.

Research goal

We invest about $10 million annually in research and capability that reduces the impact of natural hazards on people, property and community. This contributes to our organisation's overall resilience vision that natural hazards resilience is embedded in all aspects of decision-making for our homes, communities, towns and cities. We will achieve this by investing in research that builds knowledge, data and insights on natural hazards impacts and ways to reduce them.

More information about our research goal and how we will achieve it can be found in our Research Strategy. We encourage applicants to read our Research Strategy to get a better understanding of our approach to research funding.

Ensuring your research has benefit to NHC Toka Tū Ake and insured persons

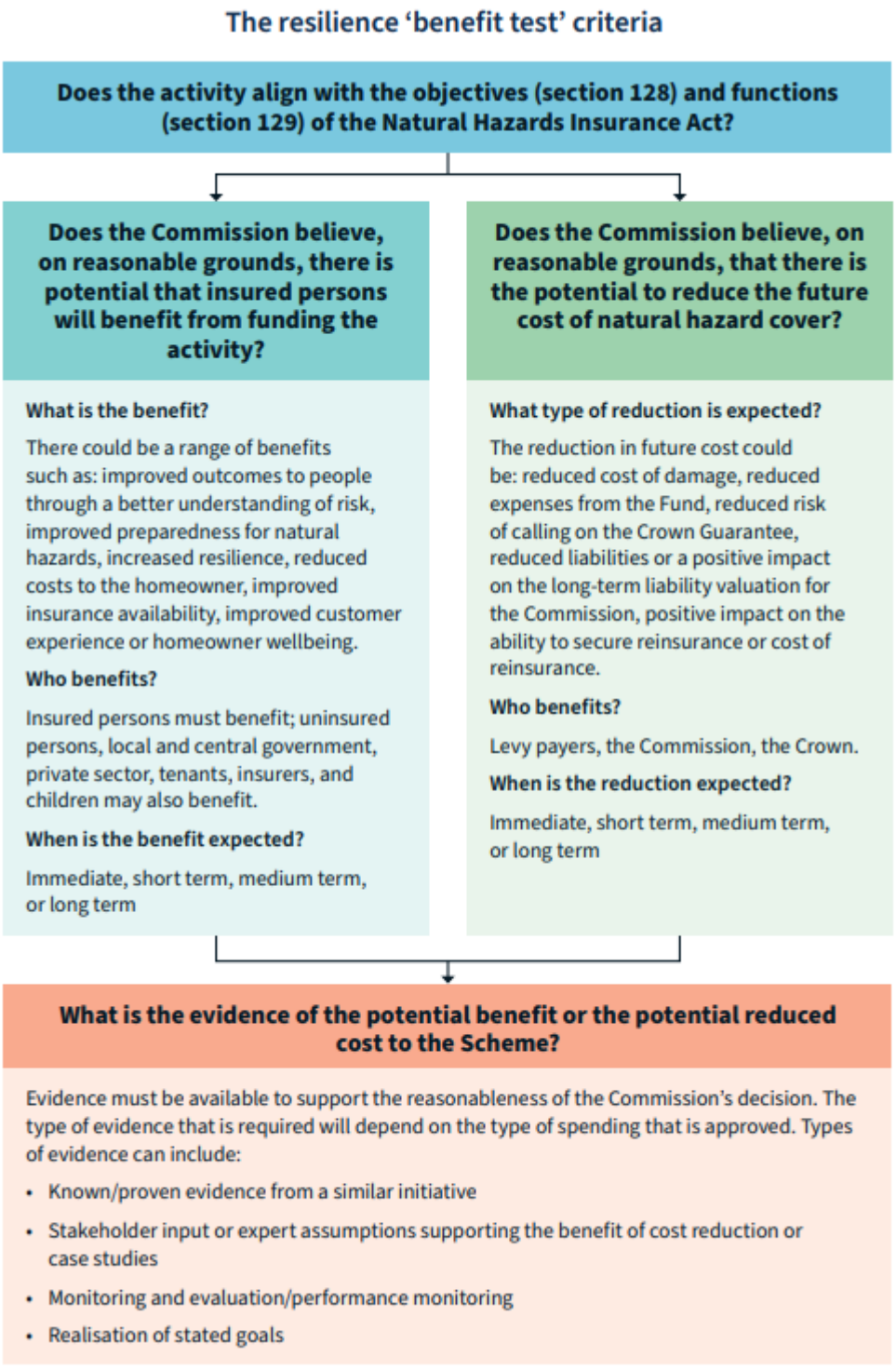
In 2024, with the introduction of the Natural Hazards Insurance (NHI) Act, we adopted a benefits management approach to identify, define, measure and manage the delivery of potential benefits from the research we fund. The NHI Act requires us to access the potential benefit of any resilience focussed activity, including research.

More information on benefits management is included in our Resilience Strategy and our Research Strategy.

A successful proposal will describe a clear path to uptake. We appreciate that the outcomes of some research may be aspirational, but proposals should always clearly articulate how the findings could be used to improve New Zealand's resilience to natural hazards.

We are particularly interested in hearing from applicants how their outputs will be made available for public use, where appropriate, as well use by our teams.

Figure: Does your research meet our resilience 'benefit test'?



Research themes

Our research portfolio is split into four themes, or key areas of investment, that support our resilience goal. We expect applicants to clearly articulate in their proposals how their research aligns with one or more of these themes. More information on each theme is included in the subsections below.

Figure: Summary of research themes

Applicants should also consider how broader themes, such as climate change, social science, specific community needs and mātauranga Māori may be relevant to their research. We encourage researchers to apply one or more of these lenses to their proposals to reflect their philosophy and design. For example, along with addressing one (or more) of the research themes, does the research also consider how climate change may influence the frequency and severity of certain hazards, or increase participation of Māori in disaster risk management?

Areas of interest for our research themes

Many of the focus areas listed on the following pages are relevant to more than one research theme. We encourage you to read all sections to get a complete picture of our priorities.

Quantifying hazards and impacts

Research under this theme focuses on quantifying hazards and their impacts through data collection, data analysis and modelling. These projects contribute to mapping and modelling of natural hazards, assessing direct impacts, and understanding climate change impacts on these. Examples of projects we are interested in funding under this theme include:

- Developing consistent national approaches to mapping and modelling NHC Toka Tū Ake-covered natural hazard risks, with a focus on consistent and interoperable data and information.
- Improving natural hazard models for ‘under-developed’ hazards (such as slope stability, rainfall-induced landslide, flooding, storm surge, tsunami, geo-thermal, and fire following event)
- Gaining probabilistic, post-event, and scenario modelling capabilities across all covered hazards.
- Understanding how climate change will affect the frequency, severity and geographic extent of natural hazards that NHC Toka Tū Ake covers.
- Improving models of hazard impacts to incorporate changes expected based on climate models and adaptations, including damage following the event.
- Advancing our ability to model multi, cascading and compounding hazards, particularly for loss modelling purposes (e.g. fire following).

- Advancing fragility and vulnerability models, especially where there is an opportunity to reflect the unique Aotearoa New Zealand environment or where there is a lack of local knowledge.
- Understanding social and cultural aspects of natural hazard risk to improve modelling.
- Modelling the direct and/or indirect costs of natural hazards and the benefits of interventions to enable natural hazard resilience.
- Understanding the Natural Hazard Fund's financial exposure to a range of hazard scenarios under a range of market conditions.
- Understanding the costs of rebuilding following a disaster; including demolition, disruption, legal, and social costs.
- Collation and collection of fundamental data to support quantifying hazards and risks.
- Interrogating and assessing existing data to better understand which communities and assets are and will be exposed to natural hazards, including:
- how owner-occupier versus tenanted properties are affected, and
    - the demographics most exposed.
- Expanding on the current understanding of hazards and risk using alternative approaches e.g. written records, oral histories, community knowledge and mātauranga Māori.

Examples of currently funded projects in this theme:

- Seismic hazards from earthquakes in the locked zone offshore Wellington – led by Martha Savage, Victoria University of Wellington
- Dynamic volcanic ash forecasting for Aotearoa New Zealand – led by Josh Hayes, GNS
- Quantifying corrosion to improve Aotearoa's built environment resilience to future volcanic eruptions – led Carol Stewart, Massey University
- National probabilistic tsunami risk model – led by Bill Fry and William Power, GNS
- GeoNet – led by GNS
- Understanding seismic hazard in Aotearoa New Zealand's low seismicity regions – led by Jack Williams, University of Otago
- How misleading are past experiences when planning for future record-shattering rainfall extremes? – led by Luke Harrington, University of Waikato
- Resilience to earthquake and landslide multi-hazards – led by Timothy Stahl, University of Canterbury
- Next-generation seismic hazard analysis for New Zealand – led by Brendon Bradley, University of Canterbury

Supporting people and decisions

Research can build our knowledge of how people and communities understand and respond to risk, when and how their responses are effective, and how they can be supported to respond more effectively. Research in this theme also looks to understand how markets and businesses are impacting future resilience, especially through insurance. We are interested in the following types of projects under this research theme:

Understanding risk perception and decision-making

- Understanding how people receive, understand, and act upon risk information, and how to improve natural hazard communications for effective decision making, including exploring risk perception, conveying uncertainty, understanding competing influences, and the impact of time preferences.
- Developing techniques for effectively communicating risk, including visualisation methodologies and comparing relative risks
- Exploring the societal consequences of changing risk information and evaluating different ways of conveying these changes, for example from recent and past experiences and commemorations.

Empowering communities

- Contributing to natural hazard risk reduction and resilience through distinctive indigenous research and development, including on:
    - Taiao/environmental connections – strengthening disaster resilience through

iwi and hapū relationships with land and sea,
    - Hauora/well-being – improving social and well-being aspects of disaster resilience, and
    - Mātauranga/knowledge – exploring Māori knowledge and innovation regarding risk assessment, evaluation and management.
- Understanding resilience opportunities and lessons in various housing arrangements such as communal living models e.g. papakāinga developments.

Insurance decision-making

- Investigating trends in insurance markets, nationally and internationally, including exploring insurer reactions, behaviour and opportunities in response to natural hazard events and climate change.
- Understanding the consequences and cascading effects of increasingly risk-based insurance pricing, particularly to the accessibility of insurance within communities.
- Understanding if, when, and why we see different levels of insurance uptake. In particular:
    - understanding different types of underinsurance and their extent.
    - understanding the reasons for underinsurance and who it affects.
- Identifying the levers that increase participation of underrepresented groups in disaster risk management, including Māori and Pasifika, socio-economically vulnerable communities, and minority groups.

Understanding resilience behaviours

- Understanding how people have achieved resilience, and what influenced that achievement including individual, institutional and community-level influences.
- Understanding what barriers there are to individuals, households, whānau and communities becoming more resilient.
- Exploring when and how non-monetary incentives can be used to encourage increased resilience.
- Investigating financial mechanisms and incentives for reducing risk and building resilience.
- Exploring how behavioural science theory and practice could be applied to better understand and improve resilience outcomes.
- Exploring how successful outcomes can be enabled through incidental actions as opposed to explicit natural hazard resilience behaviours.
- Exploring the use of disclaimers, caveats, visual aids, ratings, and other statements

about ‘uncertainty’ on hazard risk information and what that means for use by various parties and incentives to uptake.

Examples of currently funded projects in this theme:

- Insurance settlement following the 2016 Kaikōura Hurunui earthquake a comparison of rural, town and city claimant experiences and behaviours – led by Cameron Eade, Resilient Organisations
- An examination of the science policy interface for disaster risk reduction, resilience and emergency management – Delia Tamsen PhD, Massey University
- Managed Retreat, Private Insurance Retreat, Public Insurance, and the Connections Between Them – led by Ilan Noy, Victoria University of Wellington
- Building Resilience and Adaptation into Mana Whakahono a Rohe – led by Lara Taylor, E Oho
- Advancing national and community-based public education for impactful change – led by Julia Becker, Massey University

Resilient buildings

This research theme helps us understand how building design can support resilience, as well as supporting the production of guidance to put the latest research into practice. It supports the goal of our Resilient Homes and Buildings Action Plan, which is *for everyone in New Zealand to live in a home that meets their expectations of being resilient to natural hazard risks*. We're interested in funding the following types of projects under this research theme:

General design

- Understanding the design guidance requirements for 'functional recovery'.
- Improving the design of residential properties (includes houses, low rise units/townhouses and multi-storey apartment buildings) to natural hazards, including updates to standards.
- Exploring low damage design/technology and repairability for residential properties.
- Improving seismic assessment and exploring cost-effective retrofit for residential properties.
- Understanding both beneficial and detrimental effects of soil structure interaction (SSI) or other aspects of ground performance to improve the design and assessment of residential properties.
- Understanding how architectural design can increase resilience of residential properties.
- Exploring ways to improve the performance of non-structural components, from design to installation.

- Understanding the opportunities, trade-offs and possible risks to the resilience of the built environment to natural hazards when considering carbon-neutral or climate-change adaptation.

Cost implications

- Understanding the incremental costs of increasing resilience in residential properties, including the feasibility of incremental retrofits.
- Exploring decision tools for setting design targets, including cost benefit analysis.

Building characteristics and modelling

- Damage or fragility functions for residential properties (and their key components), especially for tsunamis, landslides, and volcanic hazards.
- Understanding the characteristics of New Zealand's building stock, focusing on where and what buildings and infrastructure are most vulnerable.

System settings and levers

- Consideration of risk settings and tolerance in the built environment, including regulatory minimum requirements, building ratings, targets and risk communication.
- Understanding the social, economic and technical challenges for engineers, building owners and local authorities in relation to the Earthquake Prone Building Policy.
- Exploring 'build back better' methods and technologies for effective post-disaster recovery, repair and reconstruction of residential properties (comprising house and land), including after high impact weather events.

Examples of currently funded projects under this theme:

- Embodied carbon: a driver for change towards seismically resilient high-density housing - led by Charlotte Toma, University of Auckland
- Integrated intelligent structural control and health monitoring using innovative methodologies – led by Sherif Beskhyroun, AUT
- Whole-of-Building approach to improve seismic retrofits of buildings in New Zealand – led by Santiago Pujol, University of Canterbury
- Learning from earthquakes mission to Taiwan – led by Pathmanathan Brabhaharan NZSEE
- Engineering for stronger homes and better land in Aotearoa New Zealand – led by Liam Wotherspoon, University of Auckland
- Robust and low-damage structural design for housing – led by Richard Henry, University of Auckland

Smarter land use

Credit: Lloyd Homer/GNS Science

Land use planning is one of the most effective and proactive ways of reducing natural hazard risk. Research under this theme supports the goal of our Smarter Land Use Action Plan for Risk Reduction: *to take a proactive approach to reduce our current and future risks through smarter, risk-based, land use planning*. We're interested in funding the following types of projects under this research theme:

- Understanding how new and emerging governance and land use planning mechanisms (including the precautionary principle) could overcome challenges and create opportunities to better control the location, density, and design of development to reduce vulnerability and exposure to natural hazards.
- Understanding the barriers to implementing existing guidance and frameworks related to natural hazard risk management, especially around what level of risk is 'significant' for land-use planning.
- Understanding best-practice long-term spatial planning approaches to manage natural hazard risk including climate change.
- Exploring what planning processes might need to change to enable resilient recovery.
- Developing risk-based adaptive planning instruments and determining how they would incorporate changing hazards and risks over time because of a warming climate and allow us to make decisions based on uncertain or incomplete information.

- Exploring the potential for incorporating risk modelling into land-use planning.
- Investigating the costs (e.g. economic, social, cultural, environmental) of poor land-use outcomes, and what led to them.
- Exploring how to develop, collate and acknowledge mātauranga Māori in land use planning processes to understand risk and respond to it.
- Investigating the infrastructural and financial thresholds for relocating communities.
- Evaluating the impact of past retreats (e.g. red zoning or land categorisations) and projecting the likely economic impacts of different proposals for future managed retreat (also known as planned relocation).
- Exploring innovative natural hazard risk reduction methods that contribute to reducing climate change and related impacts, such as the use of native flora to mitigate the impacts of flooding.
- Investigating the relationship between land-use planning decisions on risk and insurance availability, including insurance retreat (beyond managed retreat).
- Examining the role of AI in land use planning to reduce natural hazard risk.
- Examining the role of imperfect natural hazard data in land use planning decisions and the factors limiting the use of this data by local authorities.

Examples of currently funded projects under this theme:

- High spatial resolution simulation platform for integrating land use, economics, and infrastructure – led by Robert Cardwell, Market Economics
- Slope hazard hotspots in Aotearoa's changing climate – led by Katherine Yates, University of Canterbury
- A new direction: opportunities for national direction on hazard management during RMA reform – Caelan Church, PhD at Otago University
- New Zealand Planning Institute sponsorship
- It's Our Fault research programme
- DEVORA research programme (DEtermining VOlcanic Risk in Auckland)
- Slope stability guidance – led by NZ Geotechnical Society
- Developing an agent-based land-use modelling approach to understand future multi-hazard urban risk profiles – led by Iain White, University of Waikato

Want to know more?

Visit the All about Funding section of our website for more information on our contestable funding rounds, currently funded projects, and useful documents and templates.

You can also email us at Research@naturalhazards.govt.nz with any queries.