EQC
EARTHQUAKE COMMISSION
Kōmihana Rūwhenua

Addressing New Zealand's current and future disaster resilience challenges

RESILIENCE STRATEGY FOR NATURAL HAZARD RISK REDUCTION 2019 - 2029

Our mission
to reduce the impact on people and property when natural disasters occur

November 2019

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Image: Lloyd Homer, GNS Science

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High exposure to natural hazard risks

New Zealand straddles the boundary of two active tectonic plates and is highly exposed to catastrophic geological hazards such as earthquakes, landslides, volcanic activity and tsunami. Climate change is increasing New Zealand's exposure through more frequent and severe extreme weather events, and through sea level rise.

Built assets are vulnerable to damage by natural hazards which results in significant social costs

These natural hazards frequently cause damage to land and buildings, as well as to essential infrastructure serving communities, including power and communication networks, roads, and water systems. For some events, the combination or scale of damage may be such that significant numbers of people are unable to return to their homes either temporarily or permanently. The cost of this social dislocation and economic disruption can be many times greater than the direct cost of repairing the physical damage.

Small economy cannot sustain the social and financial costs of ongoing hazard events

When these events occur in a New Zealand community, the economic impact can be exacerbated because we have a relatively low capacity in our built environment to absorb the shock. While insurance (risk transfer) is an essential part of supporting financial resilience and disaster recovery, it cannot reduce physical damage or fully address the resulting social disruption.

Prevailing attitudes and biases about natural hazard risks

Research shows that humans are not naturally disposed towards planning for natural hazard events that occur infrequently even though we know the consequences can be catastrophic. There remain significant barriers to nudging behaviour from awareness to taking action.

Communities require risk management solutions based on knowledge and understanding

The only way to lower damage levels and reduce the social disruption caused by disasters is to build more resilient buildings on suitable land, with more resilient essential service infrastructure. Alongside a better understanding of the cultural characteristics and objectives of communities, we need to use additional and appropriate pre-event management tools such as land-use planning to avoid the worst risks, and building regulation and innovative design to control damage. Actions to avoid and reduce damage will require better use of existing data and knowledge, and creation of new knowledge to fill gaps in our understanding of New Zealand's hazard risk profile. Knowledge must be integrated and interpreted to generate new insights and solutions, and the right tools used to assist often complex decision-making.

The natural hazard management system needs greater coordination

While disasters affect whole communities, decisions on risk and resilience are often taken by individuals and agencies in a fragmented way that can result in poor allocation of resources and sometimes unintended consequences. Achieving changes to the way New Zealand manages disaster risk requires natural hazard impacts to be considered in decision-making equally alongside all other aspects of community wellbeing. Such decisions need to be informed by the ability to estimate the full costs of natural hazard impacts, which will enable assessment and prioritisation of resilience initiatives. Collaboration at all levels of society will be needed to have a shared view of the level of resilience considered to be cost-effective, from homeowners through to central government, and across the public and private sectors.

EQC's Strategic Intentions 2018 - 2022

EQC exists to support management of natural hazard risks by providing affordable insurance to help households recover from disaster, enabled through administering the Natural Disaster Fund (NDF) and international reinsurance.

EQC also has a statutory function to invest in research and education about natural disaster damage and methods for reducing risk and building resilience prior to an event.

EQC's mission is to reduce the impact on people and property when natural disasters occur.

EQC identified three strategic intentions to support its vision and mission over four years:

1. EQC is a leader in New Zealand on natural hazard risk reduction
2. New Zealanders have access to natural disaster insurance and reinsurance
3. Claims made to EQC's insurance scheme are managed fairly, transparently and in a timely manner.

Each of the strategic intentions has outcomes defining specific areas of delivery:

- Increase community resilience to natural disasters
- New Zealand has an affordable and sustainable natural disaster insurance scheme
- Improve customers' recovery from natural disasters.

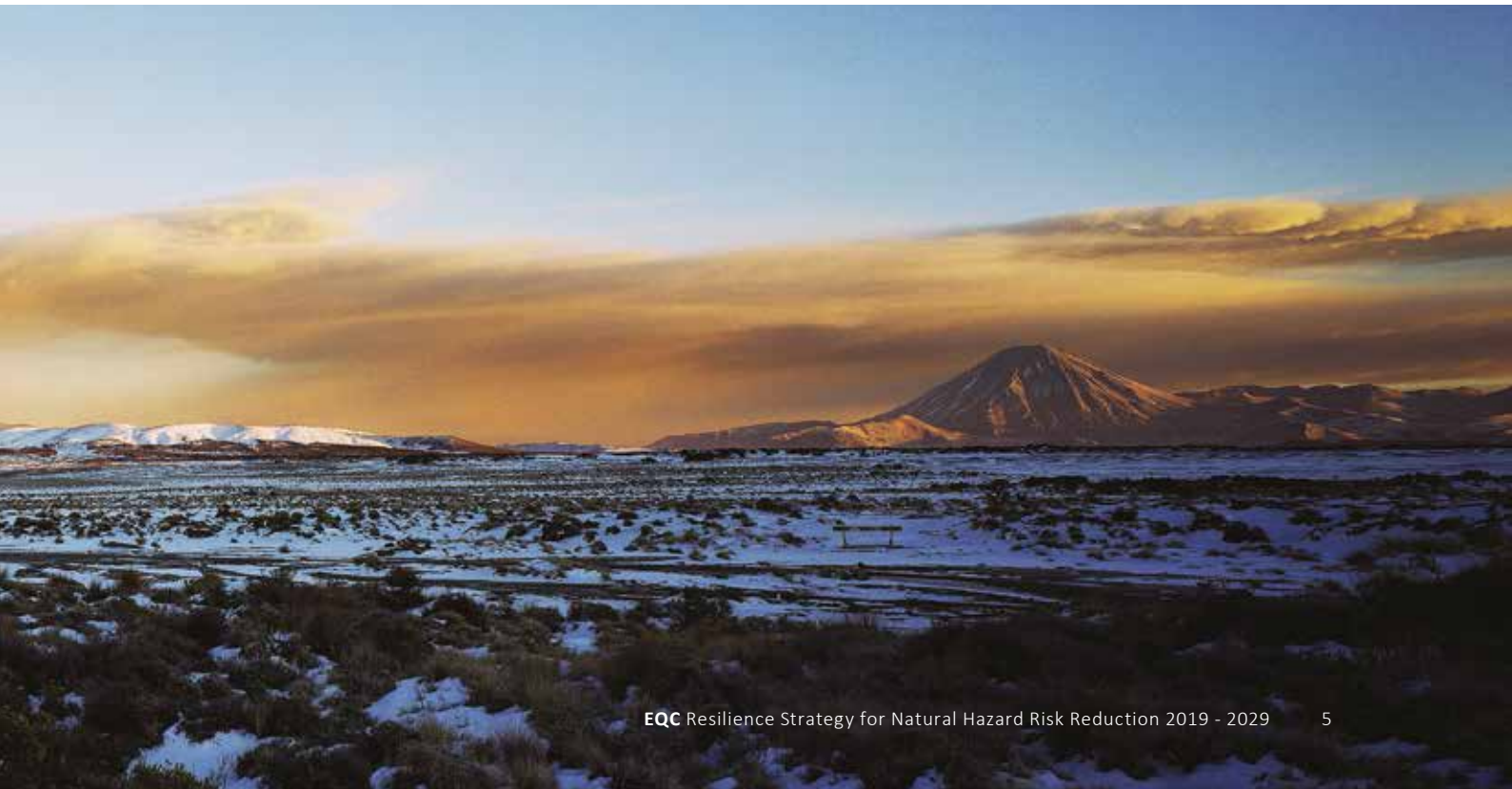
The following Strategy describes how EQC's mandate for research facilitation and education will align with the overall strategic intent and the successful delivery of EQC's resilience outcomes.

EQC's Resilience Strategy

This Strategy sets out EQC's ambition to play a key role in addressing New Zealand's current and future disaster resilience challenges, through a focus on risk reduction actions, driven by our research and education mandate.

EQC's Resilience Strategy:

- Defines the resilience objectives EQC wants to achieve
- Sets out what we aim to deliver
- Describes how we want to work
- Identifies who we need to work with.



Our disaster resilience vision for New Zealand

Our vision is that natural hazards resilience becomes embedded in all aspects of decision-making for our homes, towns and cities.

A future resilient New Zealand community is one in which the potential consequences of social and economic disruption by natural hazards are consciously considered, quantified, and included in everyday development decisions.

HOMEOWNERS are risk-aware and understand the choices they can make about the types of buildings and locations that are more resilient to natural hazards.

ENGINEERS, ARCHITECTS, DEVELOPERS AND BUILDERS understand the value of incorporating damage-limiting design in buildings and other infrastructure, which means the building stock becomes more resilient with time.

COUNCILS actively consider natural hazards in their short-term and long-term planning and understand the trade-offs that need to be made between investment in disaster risk reduction (such as avoiding the worst land, retrofitting buildings and upgrading buried pipes) and other opportunities for community wellbeing investments.

CENTRAL GOVERNMENT, in consultation with the community, sets performance objectives for the built environment that seek to minimise damage and disruption from natural hazards at reasonable cost.

INSURERS AND REINSURERS have confidence in the New Zealand market as a result of the investment by EQC and others in understanding natural hazard risk, and because of the effective integrated approach to risk treatment through building and land-use policies.

URBAN AND LAND-USE PLANNERS understand the value of incorporating resilience planning principles and options for avoiding the worst hazard risks in urban and land-use plans, which means exposure is managed down over time.

Stronger homes, built on better land, served by resilient infrastructure, supported by affordable risk capital

"The challenge is to move from managing disasters to managing disaster risk reduction"

António Guterres, UN Secretary-General

Resilience goal

Our resilience goal is to inform, enable and influence the choices and decisions that reduce vulnerability and the exposure of New Zealand's built environment to natural hazard events. In simple terms the result will be **stronger homes, built on better land, served by resilient infrastructure, supported by affordable risk capital**. The following objectives are critical to achieving this goal:

What we will do

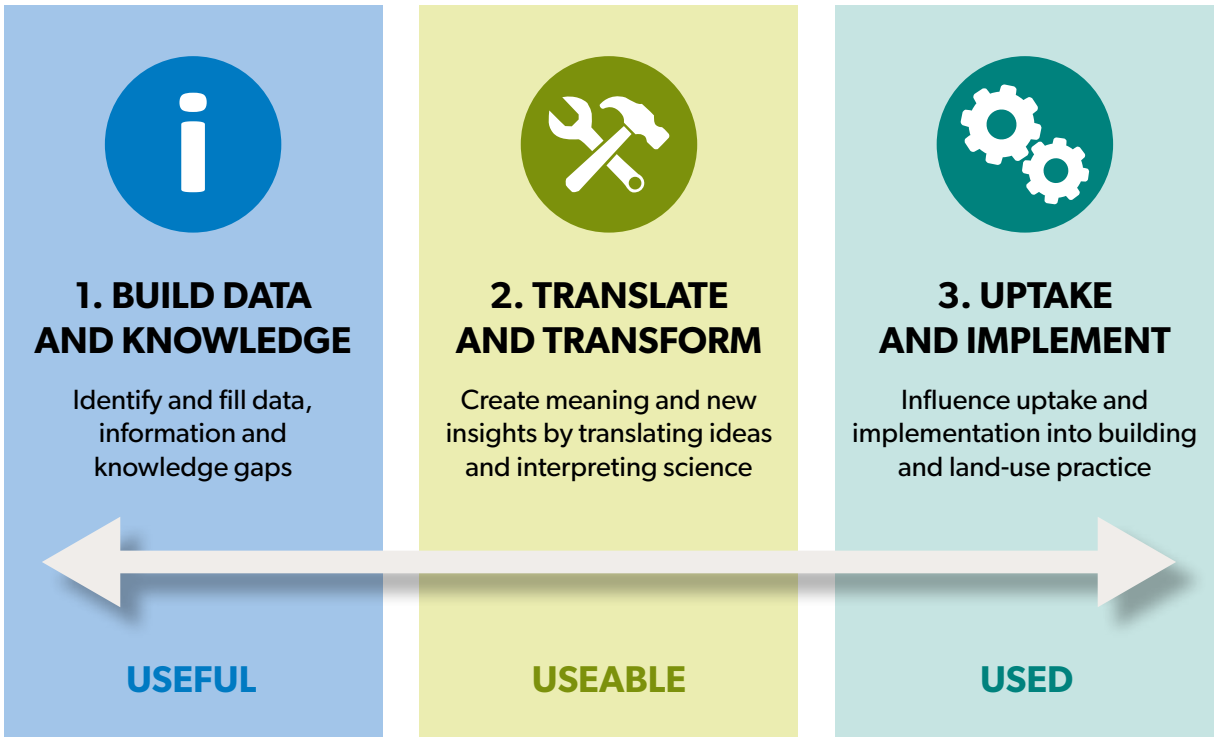
In pursuing the goal of reducing New Zealand's vulnerability to natural hazards, we will invest in creating, integrating and translating information and knowledge to drive risk reduction actions and build readiness to improve resilience.

EQC's role is to facilitate the translation and integration of information and knowledge, create the tools to understand and estimate disaster impacts, and to quantify the return on investment from enhanced resilience.

Key mechanisms for creating value include: making useful data and information accessible; facilitating and funding research to improve our understanding of natural hazard risks; and informing the development of cost-effective engineering and planning solutions.

It will also involve the development of new capabilities to synthesise and transform knowledge into useable products and tools, such as quantitative impact models and technical guidance.

To deliver on the science to practice 'value chain' we also need to ensure that the 'useable' tools and outputs are 'used' to assess and prioritise risk reduction actions. This will require new partnerships and engagement with policy-makers, planners, engineers, asset managers and homeowners to ensure the right knowledge in the right form reaches the right people at the right time.



Our focus areas

Over the 10-year horizon for this Strategy, EQC will deliver high-quality data, knowledge and expertise, and more effectively communicate the risk treatment options for risk reduction action.

We will lead and support work required to:

1. BUILD DATA AND KNOWLEDGE

Addressing data, information and knowledge gaps

We will:

- Work in partnership with end-users to ensure that decision-making requirements are prioritised
- Aggregate data and science within and across disciplines relevant to hazard risk management
- Invest directly and influence the national research agenda to:
  - Build understanding of New Zealand's hazard risk profile
  - Build understanding of the physical, social and economic impact of disasters, and behavioural responses to risk
  - Support innovative and resilient engineering and land-use solutions
- Ensure sustainable support for key research capability for New Zealand.

2. TRANSLATE AND TRANSFORM

Creating meaning and new insights

We will lead and support:

- Interpretation and translation of science and research
- Acceleration of new qualitative and quantitative products and approaches to hazard risk management, such as:
  - Risk communication products, technical guidance and policy advice
  - Improved analytics and modelling of hazard risk exposure, including estimating potential financial, economic and social impacts
  - Other decision support tools and products for risk reduction and readiness.

3. UPTAKE AND IMPLEMENT

To create the risk reduction impacts we seek, we will:

Influence risk reduction action

- Through enhanced analysis and policy coordination with regulatory agencies and accelerated education and training for key stakeholders.

Advocate for natural hazard resilience

- As a national priority requiring improved coordination and unified leadership across the natural hazard management system.

Priorities over the next three years

1. **Enhancing loss modelling/impact estimation products** to drive planning and policy settings, assessment of resilience costs and benefits, and operational benefits for EQC readiness and response.

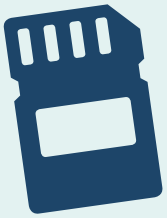
Initial priority

- Replatforming existing capability and expanding the hazard types that can be modelled

2. **A renewed focus on the strategic value of data and information.** In particular, EQC will prioritise smarter and more consistent collection and management of physical, financial and economic exposure and loss information related to the housing stock, residential land and service connections.

Initial priorities

- Geotechnical data in high-risk areas
- Improved sharing of hazard information



3. **Coordinated and targeted science investment,** with an expanded focus on insurance market and social-behavioural responses to hazard risk, and the research to support impact estimation beyond earthquake hazard.

Initial priorities

- Research on the effects of risk-based insurance coverage
- Improved volcanic and landslide hazard models

4. **Accelerating the synthesis and translation of research outputs** to develop new products and tools for hazard risk management, including education and training resources to improve design and construction practices, raise risk literacy and encourage consistent regulatory compliance.

Initial priority

- Engineering guidance for seismic improvement of buildings

5. **Developing reciprocal partnerships** with a wider range of stakeholders to deliver information and guidance to drive risk reduction action.

Initial priority

- Local government and key regulators

How we will work

Our guiding principles

In pursuing our vision of a disaster resilient New Zealand, the following seven principles guide our actions and behaviour.

Vision Mātauranga

EQC is committed to the policy themes and outcomes of Vision Mātauranga, the New Zealand government science policy framework that seeks to unlock the innovation potential of Māori knowledge, people and resources. Vision Mātauranga themes relevant to disaster reduction and resilience research are:

- Indigenous innovation: Contributing to disaster resilience and risk reduction through distinctive research and development.
- Taiao/Environment: Achieving disaster resilience through iwi and hapū relationships with land and sea.
- Hauora/Health: Improving health and social wellbeing aspects linked to disaster resilience.
- Mātauranga: Exploring indigenous knowledge and science and innovation, regarding hazard risk management.

Working across the natural hazards risk management system

Achieving the Strategy's resilience goal will require coordination and actions that lie beyond the direct role of EQC. Sustained engagement with key stakeholders over time and new ways of working will be required to influence these changes.

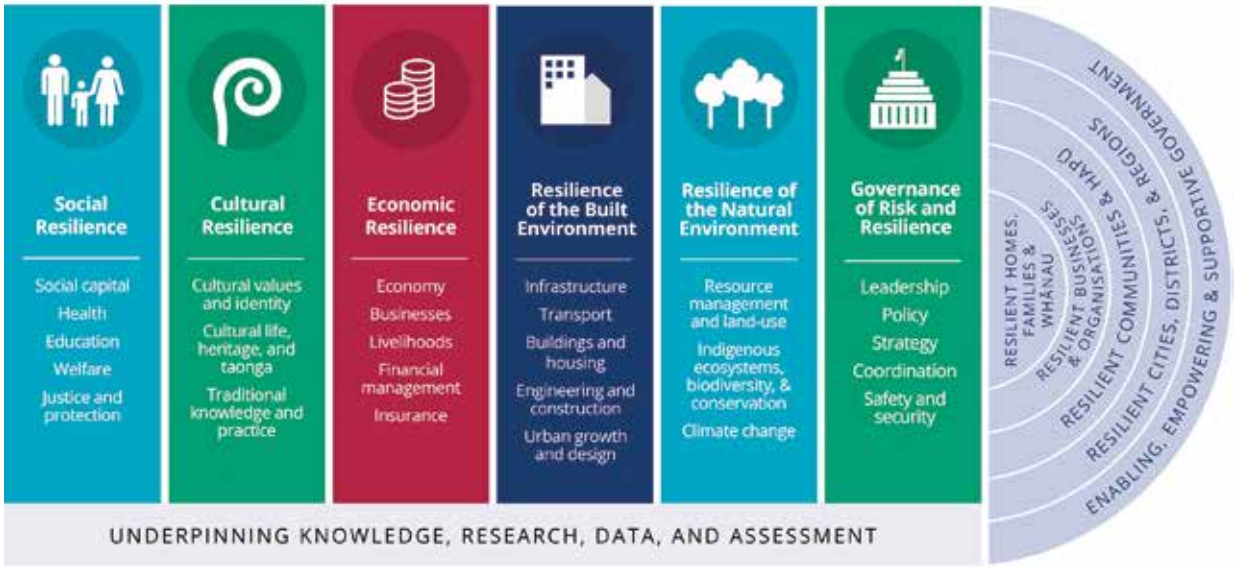
EQC has no regulatory power to compel change but we will leverage our track record of research excellence and facilitation to foster cooperation across the natural hazard science, risk financing and risk reduction sectors. Through this we will seek to reduce barriers to communication and accelerate improvements to risk management practice within EQC and across the community.

EQC has identified a number of issues that limit the assessment and treatment of hazard risk at a national level:

1. The absence of a single, sector-wide view of natural hazard risk allows risk to be passed to the Crown without this transfer being widely understood.
2. There is no formal structure or unified leadership that sets and implements performance objectives for resilience to natural hazards. Important parts of the system depend on informal relationships and goodwill.
3. The use of data and research could be improved through better coordination and an increased focus on filling gaps in our knowledge and understanding.
4. Skilled resources are lacking in natural hazards science modelling, and some models and modelling capability are not optimised. Problems include duplication and limitations of design legacy and funding, which reduces the ability to remain current and make best use of international resources.
5. Risk treatment services, initiatives and outcomes are not well measured, and there is a lack of New Zealand-specific information on return on investment for risk reduction. This lack of analysis and information limits the ability of public policy-makers to consider the full range of impacts of their policies and decisions.

EQC has a role in supporting the National Disaster Resilience Strategy

A national view of disaster resilience



Department of the Prime Minister and Cabinet 2019

The EQC Resilience Strategy aligns strongly with the government's National Disaster Resilience Strategy, released in April 2019 under the mandate of the Civil Defence Emergency Management Act 2002. Both documents have the broad intent of strengthening the resilience of New Zealand so that the hazards, crises and emergencies we will inevitably face do not become disasters that threaten our wellbeing and prosperity.

The National Disaster Resilience Strategy promotes a whole-of-society approach and emphasises the message that "everyone has a role in a disaster resilient nation". It proposes a three-pronged approach to improve the nation's resilience to disasters:

1. minimising the risks we face and limiting the significance of impacts to be managed in a crisis
2. building the capability and capacity to manage emergencies when they do happen, and
3. enabling, empowering, and supporting communities to act for themselves and others when faced with risk or disruption.

The National Disaster Resilience Strategy describes a model of a resilient nation, being resilient practices across the social, cultural, economic, built, natural, and governance environments, and at a household/whānau, community, business/organisation, city/district, and national level (diagram above) – a blend of bottom-up, grassroots initiatives, and an enabling, empowering, and supportive policy environment at a local and central government level.

Calculating the resilience dividend

Impact estimation can address the question of how much to invest now, to lower disaster impact costs later.

Natural hazard risk is created through decisions taken in the construction and location of our buildings and infrastructure. A shift to better practice requires the ability to quantify the true social and economic impacts of natural hazard damage and disruption, beyond direct financial losses. In the absence of this holistic view of risk, most benefit-cost analyses for enhanced resilience have lacked the necessary rigour and predictive insight.

Loss modelling and impact estimation provide a quantitative tool to allow natural hazard, asset and economic data to be integrated and made useable for both risk transfer and risk reduction decisions. EQC uses loss modelling tools to develop scenarios for event-readiness, and to develop better event response and claims management strategies. Our loss modelling is supported by EQC's significant investment in science, including geophysical and geotechnical data collection and the research application of related knowledge.

EQC is updating its capability to extend the range of natural hazards that can be modelled and is making better use of Geographic Information System (GIS) expertise to display, analyse and model diverse data.

These enhanced capabilities will support EQC's ability to model future scenarios and mitigation options for a broad range of natural hazards including earthquakes, liquefaction, volcanic eruption, landslide, flood and tsunami.

Through this research investment and modelling, EQC will also significantly enhance its ability to scale, direct and coordinate the response to major hazard events, and extend its financial simulation of economic and social costs to future scenarios.

When action delivers results

Identifying the specific information needs of decision-makers is essential for the success of EQC's Resilience Strategy. The requirements of the reinsurance sector, from which there is strong demand for science knowledge and insights into New Zealand's hazard risk profile, are relatively well understood.

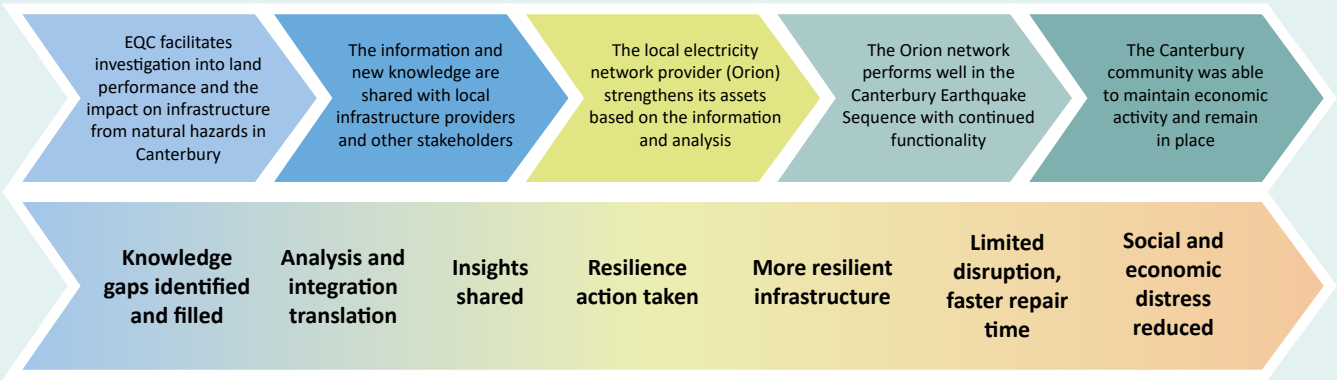
The same cannot be said of the diverse groups involved in land-use and construction practices. There has been strong demand for EQC-supported advice, guidance and standards information for aspects of resilient building and infrastructure engineering, but its consistent interpretation, application and enforcement remain a work in progress. Such guidance has been always developed in partnership with local government and industry, with an emphasis on geotechnical and structural engineers.

CASE STUDY

Infrastructure resilience

In the 1990s, EQC invested in understanding the earthquake hazard in Christchurch and the potential impacts of liquefaction damage (Elder et al., 1991). This knowledge was translated and compiled for end-users (Risk and Realities, 1997) and applied by local infrastructure owners to their capital work programmes, which identified the need to strengthen parts of their networks. The results were much reduced physical damage to local network hubs and facilities throughout the Canterbury Earthquake Sequence (Fenwick, 2011), which allowed them to maintain or quickly restore supply to the city. These actions enabled the community to 'shelter in place' and reduced what otherwise would have been much wider social disruption and economic costs.

That same information did not materially influence residential land-use planning decisions prior to the Canterbury earthquakes and highlights the importance of governance accountabilities for risk and the need for clarity and alignment of regulatory policy objectives. The consequences of severe building and land damage during the Canterbury Earthquake Sequence have been greater costs and complexity in the recovery.



CASE STUDY

Ground improvement

The Canterbury Ground Improvement Programme is a recent example of EQC's influence on resilience outcomes.

This world-leading project investigated options for ground improvement and foundation design for building on liquefaction-prone land in Canterbury. It involved international collaboration and funding with EQC, the United States and multiple science agencies accessing expertise and specialised equipment to test and validate design options in Christchurch. The success of the project depended on collaboration with the Ministry of Business, Innovation and Employment (MBIE), Environment Canterbury, Christchurch City Council, insurers, engineers and the local community to ensure that design solutions would be practical, cost-effective and simple to implement.

The project outcomes included:

- Enhanced understanding of liquefaction vulnerability, which has been incorporated into loss modelling methodology
- Uptake of the new knowledge into MBIE's guidance for repairing and rebuilding homes in Canterbury, and planning guidance for building on liquefaction-prone land
- Trust and confidence among the project partners including insurers, participating Canterbury homeowners, the local consenting authority, engineers and researchers.

Who we will work with

Partners and pathways

The essence of this Strategy is enhancing the uptake and implementation of resilient building and land-use policy and practices.

Our choice of what to do and who to work with is driven by where we think the greatest value can be gained for national resilience balanced against the ease of implementation. Our current understanding of risk exposure and vulnerability is a key starting point, and leads to opportunities to leverage existing strong partnerships and channels including with Local Government New Zealand (LGNZ) and individual councils in Christchurch, Wellington and Auckland.

We will need to work closely with the building and land-use control advisors and decision-makers in central and local government to build their understanding of the potential power of impact estimation and to shape the information products and delivery mechanisms that will have the greatest influence.

WHO	WHAT	HOW
Local government	Integrated accessible hazard information Economic and social impact analysis Realistic scenarios Risk communication guidance Technical guidance for resilient design and land-use planning Training and professional development	New formal partnerships EQC Loss Modelling Capability Project Leverage existing partnerships (e.g. DEVORA/It's Our Fault resilience programmes) Integrated hazard information project Mission-driven research GeoNet and other data sources
Central government	Integrated accessible hazard information Economic and social impact analysis Realistic scenarios Technical guidance for resilient design and land-use planning Hazard risk management policy advice	New formal partnerships EQC Loss Modelling Capability Project Integrated hazard information project Mission-driven research Mapping and sharing of open data sources
Infrastructure/asset owners	Technical solutions guidance Risk communication Case studies on resilient investment	Industry partnerships for guidance development
Professionals and trade organisations	Technical solutions guidance Training and professional development	Industry partnerships for guidance development Sector training and education
Public/homeowners	Risk communication Technical solutions guidance	EQC public education Formal partnerships with local and central government on risk communication
Insurers/reinsurers	Scenarios Impact modelling Regulatory advice	Insurer engagement programme Broker services Direct engagement with reinsurers

How we will measure our progress

Each year we will measure our performance, based on the Statement of Performance Expectations for EQC, by surveying key stakeholders to gauge the extent to which:

- EQC's advice, research findings, and analysis are perceived to be of high quality and well targeted
- EQC science has been used as an evidence base for risk reduction decisions
- EQC facilitation and engagement are effective and add value.

Our stakeholder surveys will help us understand how our research and education outputs have been used for risk reduction policy and action, and how useful EQC outputs have been – including within the organisation – to enhance our event-readiness and ability to access reinsurance.

We will measure the impact our science and education activities have had on national levels of house insurance. We will also survey homeowners to monitor if EQC messages are getting through about taking action to prepare their homes for natural disaster events.

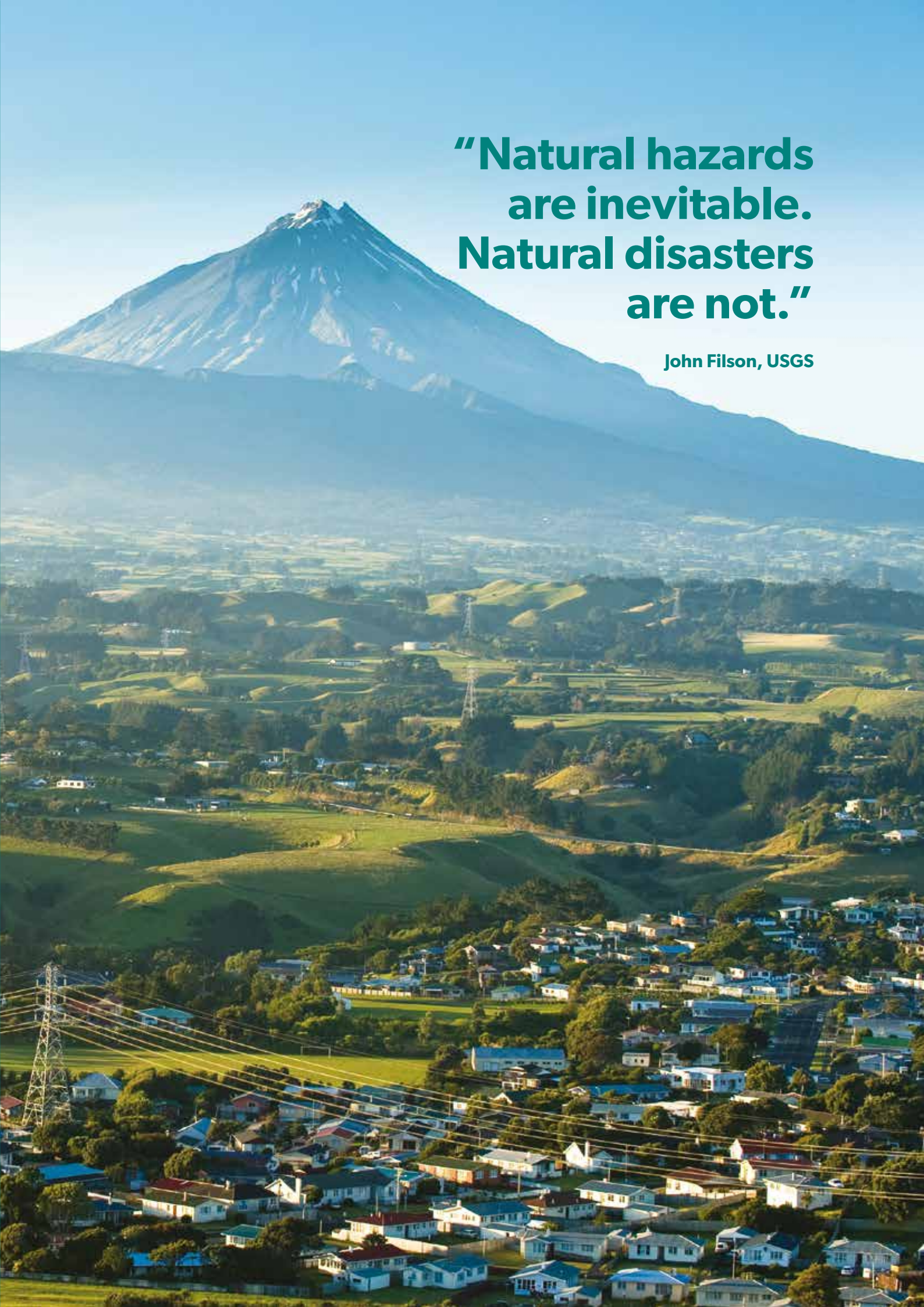
Resilience performance framework

Successful delivery of the EQC Resilience Strategy will translate to measurable reductions in New Zealand's exposure and vulnerability to natural hazards over time, in both new and existing developments.

While measurement of the change in financial risk exposure is one objective of a performance framework, performance indicators that measure long-term resilience outcomes are also required. From a nation-wide resilience strategy perspective, EQC's and the Crown's exposure liability will be reduced if the following long-term resilience outcomes are achieved:

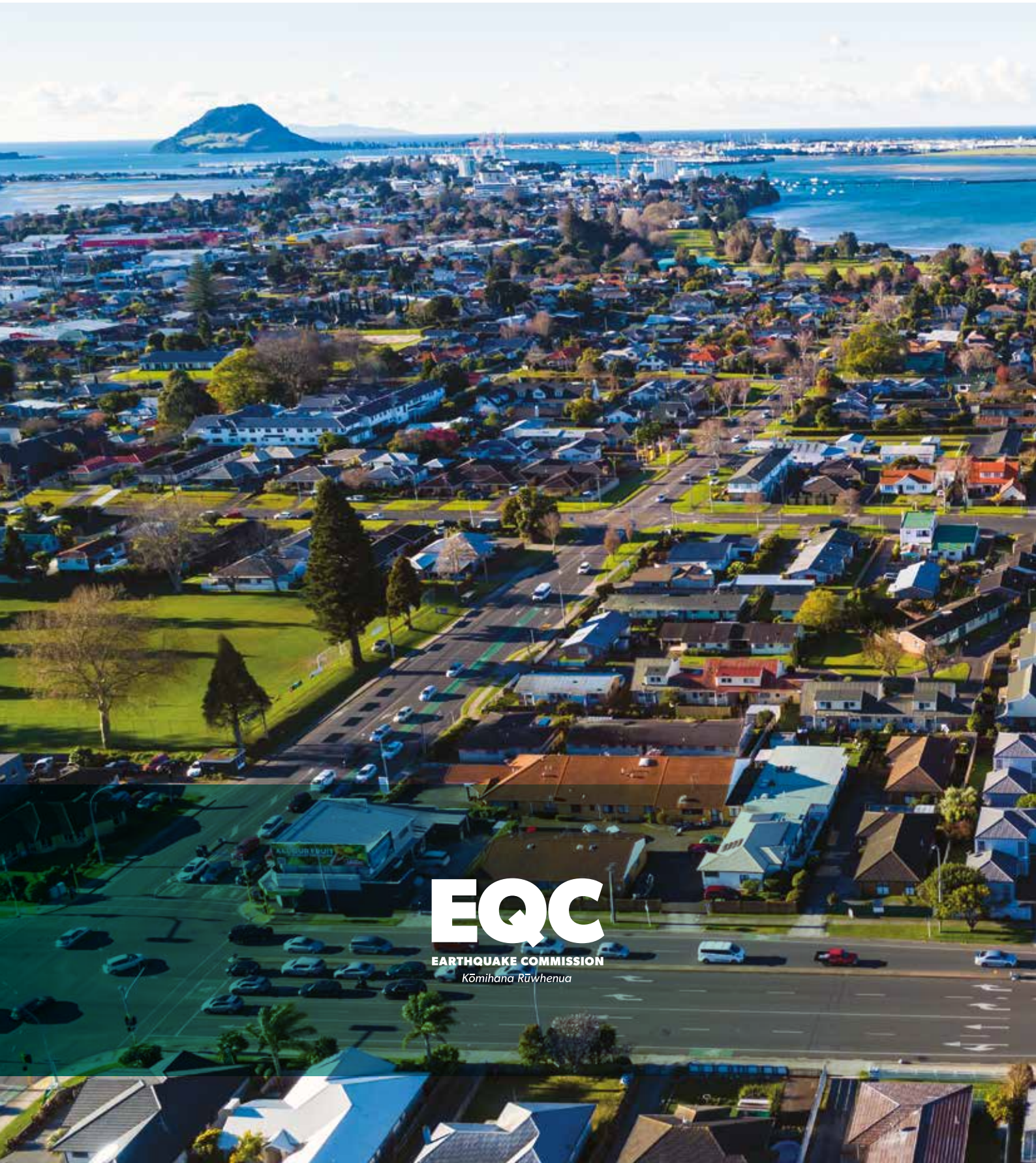
- Stronger houses are built on better land with more resilient infrastructure
- Social and economic dislocation is reduced when events happen
- Investment in resilience is valued by New Zealanders
- Unified leadership means risk treatment options are optimised for national resilience
- There is sustained and affordable access to insurance and reinsurance markets.

We will identify indicators to monitor progress toward these long-term resilience outcomes.



"Natural hazards are inevitable. Natural disasters are not."

John Filson, USGS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