Long-term Insights Briefing 2025

Building New Zealand's Long-term Resilience to Hazards

Te Whakatipu i te Tū Pakari Tauroa o Aotearoa ki ngā Pūmate

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Manatū Mō Te Taiao

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A joint foreword from the Chief Executives

Tēnā koutou katoa

Aotearoa New Zealand's unique and dramatic landscape is both a source of pride and an ever-present reminder of the challenges we face as a nation. Our multi-hazard environment – from earthquakes and tsunamis to volcanic activity and severe weather – places us among countries with an elevated disaster risk.

Building our national resilience to hazards is essential: it will give our people and economy the opportunity to thrive – not just when conditions are easy, but also when they are hard.

However, building resilience is no easy task, especially when dealing with low-probability, high-impact events – such as the Christchurch and Canterbury Earthquakes – or with multiple simultaneous hazards and a population whose diverse perspectives and incentives must be recognised.

Recent history demonstrates that major crises can occur multiple times within a single generation, forcing us to confront difficult realities. This demands a proactive approach to risk management – one that is willing to plan and make tough trade-offs to meet the challenges ahead and seize new opportunities for action. This Long-term Insights Briefing explores these themes within the context of New Zealand's evolving hazard landscape.

As the briefing states, *"Resilience is not a nice-to-have; it is a prudent way to ensure our prosperity and security".* Embedding resilience into our systems and decision-making processes is a long-term commitment that requires sustained focus, not just in the aftermath of events, and collaboration across all sectors of society, from national scale down to households. It is also a commitment that must transcend political cycles. The significant benefits of resilience are also a reason to move quickly. Action is more effective the earlier it is taken. Since the Department of the Prime Minister and Cabinet and the Ministry for the Environment began developing this briefing on behalf of the, now former, National Hazards Board, new governance arrangements have been made for the National Resilience System. These are designed to improve efficiency, minimise duplication and increase focus.

We extend our gratitude to everyone who contributed their feedback and research to this work. Your insights have enriched this briefing and helped shape a resource that we hope will advance public discourse around future challenges.

Ngā mihi

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Building New Zealand's long-term resilience to hazards

The Department of the Prime Minister and Cabinet and the Ministry for the Environment have developed this Long-term Insights Briefing to consider how New Zealand might build long-term resilience to significant hazard events.

Long-term insights briefings are not government policy; rather, they are future-focused briefings intended to support New Zealanders to consider and better plan for challenges we expect to face. The content of this briefing is intended to spark thinking, conversation and, ultimately, action – by people, institutions and communities.

In this briefing we explore and share information on:

- New Zealand's evolving hazard landscape and how we can manage risks more proactively to protect people and assets
- the trade-offs and tough decisions New Zealand will need to make in building resilience, as well as the difficult realities we will need to understand
- opportunities for action, using case studies to illustrate potential ways we could strengthen resilience, leverage technology and develop innovative infrastructure.

Section 1: Understanding the hazard landscape

New Zealand's geology and geography, along with its history of development and economic profile make significant hazards a major challenge for our nation. New Zealand faces a high level of exposure to a range of hazards – including earthquakes, volcanic activity, severe weather and flooding – and is consistently ranked among countries with elevated disaster risk due to this multi-hazard environment.[1]

As New Zealand grows, mitigating, adapting to, and recovering from these hazards becomes more difficult if we do not make the right choices. We have more at stake to manage, and climate change further exacerbates the risks. Recent crises like the global COVID-19 pandemic, and severe weather events (such as the 2023 Auckland Anniversary Weekend floods and Cyclone Gabrielle), have highlighted many of the challenges: hazards are interconnected, global trends and events have domestic consequences, and the economic and social costs can be immense.

Many New Zealanders have experienced significant hazards first-hand – the lives of over half of all New Zealanders have been impacted by natural hazards in the past three years alone. A similar number report feeling anxious or worried about the potential effects of storms and earthquakes. Although many people feel underprepared for hazard events, we know that most New Zealanders want to know more about them.[2,3]

Hazards alone do not present risk – it is only when things we value are both exposed to the hazard and are vulnerable to its effects. An earthquake, for example, is not a risk in an unpopulated area, but it becomes one in a city because people and buildings are exposed by their location and vulnerable due to factors like poor construction.[i] For a disaster to occur, it requires a hazard, exposure and vulnerability. Because we cannot stop most hazards from occurring, the principal focus for resilience-building is managing exposure and reducing vulnerability.

To best protect our people, economy, environment and way of life, New Zealand must build resilience to hazards through a proactive, whole-of-society approach.[ii] This will require learning from the past, embracing new ideas and making difficult choices.

New Zealanders are familiar with cost-of-living and housing affordability pressures. Building long-term resilience now is vital to prevent future, more serious economic disruptions and unmanageable costs that could make cost-of-living challenges even worse. **This Long-term Insights Briefing explores how New Zealand can enhance its long-term resilience to hazards.**

What is national resilience?

National resilience is the ability of a country to prevent or minimise, absorb, adapt to, recover from and transform through shocks and stresses to enhance the safety, security and prosperity of our people.

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[i] We note some people and communities, such as Māori, Pasifika, rural, disabled and low-income communities, are more inherently exposed and vulnerable to hazards than others due to existing disparities and conditions.

[ii] This means leveraging the collective knowledge, understanding and resources of all parts of the country.

This means being ready for hazards before they strike, responding effectively when they do and learning from each experience to build stronger systems and communities. This includes ensuring that people can access basic needs – such as food, shelter, water and electricity – during a crisis, while also making sure businesses and government can remain operational to minimise the interruption to everyday life.

Resilience is not immunity; it is managing impacts and adapting to a changing world to limit loss and harm. To do this well requires understanding the interconnectedness of our economic, physical, social and environmental systems. It also requires strong, informed communities where individuals know how to prepare for and respond to a crisis.

Resilience also demands fairness: ensuring that all communities, regardless of income, location, or identity, have the opportunity and capability to absorb, adapt to, recover from and transform through shocks and stresses. This includes recognising te Tiriti o Waitangi (the Treaty of Waitangi) as a foundational framework for resilience planning and ensuring Māori-led approaches are supported and embedded in national strategies.

Resilience is more than a defensive necessity; it is a strategic opportunity that forms the foundation of long-term wellbeing and prosperity. Building it strengthens the economy, builds investment confidence and establishes New Zealand's reputation as a country that innovates and cares for future generations. A resilient New Zealand is one where communities, councils and businesses can plan, invest and grow with greater certainty.

Deciding to avoid or delay building resilience is a costly option. While avoiding upfront investment may be cheaper in the short term, the long-term costs are far greater.[iii] These include more expensive clean-ups and rebuilds in the wake of disasters, greater loss of wealth and asset value, lost business opportunities and additional impacts on physical and mental health. Resilience is not a nice-to-have; it is a prudent way to ensure our prosperity and security.

New Zealand's major hazards

New Zealand's National Risk and Resilience Framework identifies the most significant potential crises, known as National Risks,[iv] that could have serious immediate and/or long-term effects on New Zealand's safety, prosperity and/or national security. The Framework ensures our National Risks are comprehensively considered and strategically planned for across central government.

These National Risks are outlined in the National Risk Register (Annex 1) and require coordinated national action to build greater preparedness and resilience.[4] National Risks are comprised of hazards (non-malicious and often natural occurrences like earthquakes) and national security threats (malicious, such as cyberattacks, armed conflict, or disruption from new technologies like AI and biotechnology). While building national resilience to threats is vital for New Zealand, this briefing will only focus on hazards[v].

The National Risk Register contains a diverse range of significant hazards. For instance, a pest or disease incursion could cause agricultural and economic havoc; a drought could harm our

[iii] According to the World Economic Forum, companies report that their current adaptation and resilience investments could yield between $2 and $19 for every $1 invested. (World Economic Forum: The Cost of Inaction: A CEO Guide to Navigating Climate Risk Annual Report 2024).

[iv] The National Risk Register includes 14 hazards and 11 national security threats.

[v] In 2023, a Long-term Insights Briefing was published on New Zealand's changing national security landscape and opportunities for the future. This briefing was led by the Department of the Prime Minister and Cabinet and the Ministry of Foreign Affairs and Trade on behalf of the Security and Intelligence Board.

economy and environment; and the failure of a major financial institution could lead to widespread economic and social damage.

However, within the Register there are some hazards that pose more danger than others: there are six major hazards that are either catastrophic in their potential or occur so frequently they produce significant cumulative impacts. Although diverse, these major hazards share common consequences: they can severely impact human welfare, heavily damage New Zealand's critical infrastructure and impose high economic costs – especially if they occur with little or no warning. These are outlined below.

Pandemics

COVID-19 showed the scale of disruption a pandemic can cause. Future pandemics are likely to occur relatively frequently – potentially around once every 25 years for a less devastating strain or around once in 200 years for a highly infectious, highly virulent pathogen(SARS-CoV-2 was not considered to be one of these more devastating pathogens).[5] Without mitigation, modelling suggests deaths in these scenarios, could range from 15,000–27,000 to 375,000–450,000.[6]

Earthquake

The Alpine Fault has a 75 percent chance of rupturing in the next 50 years and an 80 percent chance that the resulting earthquake will be at least a magnitude 8.[7] A large subduction earthquake on the southern Hikurangi Fault has a 26 percent chance of occurring in the next 50 years,[8] while the Wellington Fault has an 11 percent chance of rupturing in the Wellington–Hutt Valley segment in the next 100 years.[9] Each of these events could cause widespread damage to towns and cities, critical infrastructure and the economy.

Tsunami

While New Zealand has not experienced a catastrophic tsunami in recent times, it is vulnerable to them – whether they are triggered by an earthquake here or on the other side of the Pacific. According to GNS, a 1-in-500-year tsunami could lead to 33,000 fatalities, 27,000 injuries and $45 billion in property loss.[10]

Volcanic activity

Mount Taranaki has a 30 to 50 percent chance of erupting in the next 50 years.[11] Auckland is also built on top of a volcanic field, where it is almost certain there will be another eruption although it is unclear where or when.[12] A plausible scenario for an eruption near Māngere Bridge could require hundreds of thousands to evacuate and cause months or years-long disruptions to critical infrastructure like power and drinking water. There would also be long-term economic and land-use impacts that would challenge the longer-term recovery.[13]

While these local risks are significant, there is also a very small but real chance of a much larger event. Eruptions on the scale of Mount Tambora in 1815 (VEI 7[vi] – a very large, globally significant eruption) occur one or two times per thousand years, but their global consequences would be severe.[14] Mount Tambora is in Indonesia, and its 1815 eruption caused widespread famine and climate disruption in many parts of the world. Such events can trigger 'volcanic winters,' leading to prolonged global cooling, widespread crop failures, and cascading effects on food security, health, transport, infrastructure, supply chains and economies worldwide.

[vi] Volcanic Explosivity Index.

Severe weather and flooding

Severe weather – including strong winds, heavy or prolonged rain or snow and coastal storm surges – can trigger flooding and landslides, posing serious risks to homes, workplaces and communities. Rising temperatures and shifting weather patterns are increasing the frequency and intensity of these events, with storms, floods and droughts becoming more common and damaging.[15,16] These events already cost billions[17] and are expected to become even more economically disruptive as the climate continues to change.[18,19]

Space weather

Solar storms can disrupt and damage critical technologies and infrastructure (such as power grids, satellites and communications systems) on Earth and in space. Potential impacts range from being without power for days to degraded communications and the loss of global positioning systems. Although historic impacts of space weather in New Zealand have been relatively rare, the probability of a severe event has increased since the sun entered a 'solar maximum'[vii] in October 2024.

[vii] Solar maximum is the period of highest activity during the sun's roughly 11-year solar cycle.

Section 2: Forces that shape risk and resilience

This section outlines key forces that are shaping New Zealand's national risk and resilience profile, from domestic factors to global trends. These forces are interconnected, and a change in one area can significantly affect our exposure to risk and our capacity for resilience.

Forces that shape risk

Location and assets

New Zealand's position on the boundary of the Australian and Pacific tectonic plates makes us prone to hazards such as earthquakes, tsunami and volcanic activity.[20] Our long coastline, numerous rivers and high rainfall increase flood risk, while our geographic isolation makes trade more challenging under disruptive conditions. Like all globally connected nations, New Zealand is also vulnerable to pandemics and other transboundary hazards.

Where we build also impacts risk exposure: homes, farms, towns, cities and infrastructure in flood-prone areas or along active fault lines inherently face a greater level of risk.

Economic and supply chain risk

New Zealand's economy lacks diversification, relying heavily on relatively few key agricultural exports and trading partners, especially in Asia.[21] This makes us more susceptible to external shocks such as falling global demand, drought, animal disease outbreak, or changes in trade policy.[22] Many businesses in the rural economy have low profit margins and high debt levels, making them particularly vulnerable to disruption.[23]

This reliance on trade makes the country vulnerable to supply chain shocks and major trade disruptions. Events like COVID-19, the war in Ukraine and the Suez Canal blockage have shown how quickly disruptions can cascade. In 2024, New Zealand ratified the Indo-Pacific Economic Framework Supply Chain Agreement to strengthen regional resilience. These efforts highlight the importance of international cooperation and shared standards.

Climate change and environmental stress

Climate change and environmental stress amplify the impacts of natural hazards, increasing vulnerability across ecosystems, communities and key economic sectors. Rising temperatures and shifting weather patterns are intensifying the frequency and severity of storms, floods, droughts and wildfires – with some regions potentially facing 'very extreme' wildfire conditions in future decades[24]. These changes are already causing significant disruption and are expected to become more economically damaging over time.

This amplifying effect also threatens biodiversity and ecosystems, including marine and coastal environments.[25]

Key sectors like agriculture, forestry, fisheries and tourism – which are heavily reliant on climate-sensitive resources – face heightened vulnerability.[26] Rising adaptation costs will strain public finances, and sea-level rise (potentially a metre higher by 2100) will challenge the two-thirds of New Zealanders who live near the coast.[27]

Changing population and growing cities

New Zealand's population is increasing, older and more urban.[28] This will amplify our vulnerability to various hazards. Older people face greater health risks and evacuation challenges during disasters.[29] Simultaneously, larger, denser cities can mean higher social and economic costs when hazards strike.[30] Furthermore, development in the rural-urban interface increases the number of people at risk from hazards like wildfire[31] while isolated rural communities face unique risks, like being cut off from services.

These trends not only create new challenges but also compound existing vulnerabilities like poverty, social isolation and inadequate housing.[32]

New technologies and digital systems

Advanced technologies are reshaping the global risk landscape, introducing new dependencies and vulnerabilities. Technologies such as artificial intelligence (AI), 5G mobile internet and autonomous systems affect every nation's resilience because they are relied on for so much and because they are so hard to produce. This means there is significant disruption when they fail and an over-reliance on the handful of companies who can make them.

Advanced semiconductor chips are an example. These chips serve as the 'brains' of most advanced technologies and are essential to everything from emergency services and power grids to communications and transport systems. However, due to the difficulty of making these chips, three companies dominate the supply chain: Nvidia (USA) designs them, ASML (Netherlands) builds the machines to create them, and TSMC (Taiwan) uses those machines to manufacture them. This level of concentration creates single points of failure: disruption to the chain – whether by geopolitical tension or natural disaster – is felt worldwide, including in New Zealand.

Some wealthy nations are trying to build more resilient supply chains for these technologies through strategies such as increased domestic production, even where this is more costly and less efficient. Most other countries, including New Zealand, cannot afford this approach and are more likely to face challenges accessing critical technologies when supply chains are disrupted.

Global tensions and instability

New Zealand's resilience depends not only on physical infrastructure and supply chains, but also on the integrity of the information systems that support decision-making, public trust and global collaboration. However, geopolitical tensions and the increasing spread of misinformation and disinformation over digital platforms (amplified by AI) is placing mounting pressure on all these information systems. This trend will make global cooperation on transboundary hazards like pandemics harder, disrupt emergency responses and even endanger frontline workers during crises.[33]

Forces that shape resilience

While New Zealand faces significant risks, there are also forces that, when strengthened and invested in, can prove crucial for building resilience. Section four describes opportunities for resilience building and explores ways to strengthen some of these forces.

Strong institutions

Stable, democratic institutions can improve a nation's ability to adapt to shocks. Strengthening them through robust, transparent and anticipatory management practices can foster greater public engagement and trust in decision-making. Furthermore, strong institutional arrangements with clear roles and responsibilities and aligned financial signals can support more coordinated action for resilience building.

Science, data and knowledge

Access to robust scientific research, reliable data, and up-to-date knowledge is vital for building national resilience. These resources enable us to anticipate risks, make informed decisions in a crisis, and strategically plan for the long term. Building resilience requires a broad base of knowledge, drawing from disciplines such as earth sciences, engineering, social sciences, mātauranga Māori, and economics, and importantly, the linkages between them.

Cooperation

New Zealand's resilience is enhanced through strong collaboration with partners, particularly Australia and our Pacific neighbours. Strong cooperation can allow for improved collective capacity to respond to shared challenges – for example, by sharing critical assets in times of crisis or participating in joint manufacturing ventures for essential products like vaccines.

Social capital and trust

High levels of social capital and public trust are critical for effective crisis response and recovery. These bonds of trust and mutual support enable rapid mobilisation and collective action during times of stress. Furthermore, how we adopt te ao Māori principles such as manaakitanga will help determine the strength of our social fabric and provide a vital source of resilience.

Geographical advantages

While many of New Zealand’s geographic features pose risks, others can be crucial for building national resilience. Our island geography can give us border advantages, which proved critical during the COVID-19 pandemic when strict border controls delayed community transmission. The same isolation supports strong biosecurity measures, helping to prevent pest and disease incursions that could devastate agriculture and ecosystems. Leveraging these advantages – alongside others such as abundant natural resources, strong domestic food production, and access to renewable energy – is important in strengthening national resilience.

When risks combine and escalate

Severe weather, earthquakes and tsunami can set off other crises, such as pandemics, by displacing people, compromising sanitation and increasing human proximity to animals.[34] In addition, we often face multiple risks at the same time which can mean we experience their effects concurrently. For example, our changing climate increases the likelihood that we may face the impacts of severe weather and flooding while also experiencing other national risks such as earthquakes or national security threats (eg, cyberattacks on our information systems). New Zealand will continue to face concurrent risks spanning hazards as well as national security threats, putting pressure on our preparation efforts, response and recovery.

Hazards can also cause cascading failure in the critical infrastructure we rely on daily. A failure might be direct – for instance, a bridge collapsing from a flood could sever the water, electricity and fibre networks it carries. Or, it could be indirect, like a power cut leading to failures in drinking and wastewater systems.

The complex, interdependent nature of our infrastructure, spanning social, economic, built and natural environments, makes assessing the precise impact of disruption difficult. Disasters like the North Island Severe Weather Events highlight the significant consequences of damage to these interconnected networks. The disruption extends beyond physical assets to a community's wellbeing and health, significantly compounding the challenges faced during recovery.

Section 3: Choices in building resilience

Hard choices are unavoidable

Living with hazards and their consequences will remain a fact of life. Eliminating all risk is not possible due to unpredictable events, finite resources and the importance of personal freedoms. With growing hazard exposure, building national resilience therefore depends on making deliberate choices – about what to protect, where to retreat, when to invest and who pays and how much – in ways that are transparent, fair and repeatable over time. Many of these choices will be hard and involve trade-offs that will not please everyone.

Principles for fair and effective choices

Resilience-building decisions are complex and context-dependent. While there is no single formula, several considerations can help shape fair and effective choices – especially when decisions affect multiple agencies, regions and generations.

- **Equity and te Tiriti o Waitangi:** Resilience choices – such as infrastructure investment and land-use reform – have direct te Tiriti implications. Integrating te Tiriti obligations, mātauranga Māori and community-led perspectives helps ensure that decisions reflect who benefits, who bears costs and how impacts are distributed across generations. This is essential for resilience efforts to be not only technically sound but also socially and culturally just.
- **Proportionality:** The scale of action should match the scale of risk and consequences. This helps ensure resources are directed where they can have the greatest impact, especially for communities most exposed or vulnerable.
- **Flexibility:** Where uncertainty is high or consequences are long-term, decisions should preserve future options and avoid lock-in to costly maladaptation. This includes prioritising 'no-regrets' actions – such as better information, standards and maintenance – that build adaptive capacity and deliver benefits under many futures. Flexibility also applies to how risk and cost are shared.
- **Transparency:** Clear communication of assumptions, evidence and trade-offs is essential – especially where uncertainty is material. Striking the right balance in hazard disclosure is challenging but necessary. The risks and costs of climate change exist whether we acknowledge them or not. Avoiding transparency, such as withholding hazard information from property files, does not eliminate these risks; it simply delays effective responses and increases long-term costs. A clear understanding of property risks enables smarter, more cost-effective decisions that help communities adapt and reduce future impacts.

Understanding the trade-offs

Resilience decisions often balance two good things (eg, efficiency vs redundancy) or accept short-term cost for long-term benefit. For example, stronger planning rules can reduce exposure to flooding but may constrain where some people can live or the timing of development. Being explicit about these trade-offs at the start helps communities and decision-makers see what is gained, what is given up, and why. The table below illustrates some of the high-level trade-offs that decision-makers may face when building resilience.

Table 1: Examples of potential resilience-building trade-offs

	Deciding between	Potential outcome	Advantages	Trade-off
	**Efficiency** vs **redundancy (spare capacity)**	Use a mix of suppliers and store essential goods in different places.	Keeps goods and services flowing during disruptions.	Higher costs, especially for small and medium-sized businesses.
	**Cost** vs **robustness**	Local and central government invest in infrastructure with a higher level of service.	Long-term reliability and savings.	High upfront costs and delayed benefits.
	**Future-proofing** vs **waiting**	Investing in more resilient infrastructure pre-crisis is cheaper and mitigates harm from hazards.	Avoids passing additional costs onto future generations – when mitigations will be more expensive.	Immediate costs, equity challenges.
	**Protecting the status quo** vs **accepting a sunk cost**	Large-scale investment in protection for homes in a high-risk flood zone.	Fewer people are displaced from their homes and communities in the short term.	Residents remain in flood zone and potential for this to become more costly over time as further investment required.
	**Centralisation** vs **decentralisation**	Resources are targeted to community-level organisations to focus on resilience building.	Community organisations have demonstrated they play a vital role in preparing for and responding to emergencies.	Smaller groups may not have the capacity to respond to a large-scale crisis.
	**Individual freedoms** vs **collective resilience**	Rules and regulations on land use in risky areas are strengthened.	Fewer people exposed to hazard, lower longer-term financial risk for individuals.	Can infringe on people's ability to live where they want, or where they have in the past.

What makes these decisions hard?

Resilience-building decisions are not just technical or financial – they often reflect deeper tensions between values, priorities and timelines. While each option has its merits, choosing between them often means navigating uncertainty, competing interests and limited resources.

Several factors complicate these decisions:

- **Lack of data:** Information is not always accessible or available to aid understanding of the full impacts of hazards.[35]
- **Differing perspectives on risk:** People, businesses and communities have varying levels of risk tolerance, shaped by timelines, incentives and worldviews. For example, Māori perspectives on whenua, whakapapa and collective wellbeing may lead to different priorities than those based on overseas frameworks.
- **Opportunity cost:** Building resilience often means shifting resources away from other national goals, such as productivity or environmental protection. While 'win-win' solutions should be pursued, they are not always possible.

These tensions make it difficult to agree on how best to enhance shared assets like roads, rivers or apartment buildings. As a result, short-term interests can often win out over longer-term resilience efforts[36]. If New Zealand is to become more resilient, we must be willing to confront these trade-offs and make decisions that reflect our shared values and long-term goals.

Conceptualising risk is also hard, especially when dealing with low-probability, high-impact events or cascading hazards[37]. Yet recent history, from pandemics to cyclones, shows that a range of low-probability events can and will likely occur multiple times within a single generation.

Frameworks that support consistent and transparent decision-making are essential for managing uncertainty. Formal risk tolerance approaches – such as those proposed by the Natural Hazards Commission and embedded in tools like the Natural Hazards Portal[38] – help guide conversations about acceptable levels of risk and who bears responsibility. Similarly, tools like Dynamic Adaptive Pathways Planning are already being used by infrastructure decision-makers, such as councils, to develop flexible strategies based on likely scenarios. These frameworks offer a practical way to move from disagreement to shared understanding, and from uncertainty to action.

Who bears the risk and the cost?

Historically, New Zealand's disaster recovery costs have been shared across society (central and local government, insurers and property owners). However, climate-related hazards are reshaping the insurance landscape. If risks grow unchecked, insurance may become unaffordable or unavailable. This trend is critically important for New Zealand, where property values are high and 57 percent of our household wealth is tied up in residential property.[39]

Insurance companies are responding to increasing climate-related risk by raising premiums, limiting online quotes and withdrawing coverage in some areas altogether.[40] This insurance retreat is expected to continue. New Zealand homes and businesses are insured by international re-insurers who are facing increasing liabilities globally. As a small and higher risk insurance market, New Zealand has a strategic economic imperative to remain a viable and sustainable destination for reinsurance through proactive hazard management.[41]

By 2050, at least 10,000 homes in main coastal centres may be uninsurable,[42] and even minor sea-level rises could trigger partial insurance retreat for 99 percent of homes in high-risk coastal zones by 2034.[43] If insurance becomes too expensive or unavailable, many New Zealand homeowners will face profound impacts on the value of their homes and their ability to secure mortgages.[44]

Beyond individual households, insurance retreat presents a systemic challenge with far-reaching implications for New Zealand's financial system, housing market and intergenerational equity. It may affect bank portfolios, local government revenue and the fiscal exposure of the Crown. If not actively addressed, the cumulative effect could entrench vulnerability, undermine confidence in the housing market, and create a shadow liability for future taxpayers.

Rural insurance dynamics further complicate this picture. Unlike urban insurance, which often covers full reinstatement, rural insurance typically involves contributory models that exclude certain assets like fencing, livestock and crops. These exclusions reflect affordability constraints and limited availability, leaving rural asset owners more financially exposed.

This raises a difficult question: who should bear the financial risk – individual homeowners or the government on behalf of the wider community?

- **Individual responsibility:** Homeowners choose where to live and should bear the consequences. This approach incentivises proactive risk reduction but can lead to social disruption and economic instability.
- **Government protection:** Public support can reduce hardship but may create moral hazard, blunt market signals and shift costs to taxpayers – including those not living in high-risk areas. It also raises serious questions about fairness and equity.

But the answer to who bears responsibility need not be one or the other. Finding the path forward may require a balance and a transition – incentivising individuals to be responsible through smarter pricing and planning rules, while also having strong government support and investment in community resilience.

These challenges are real, but they also create a powerful opportunity to rethink how we manage risk, invest in resilience and support communities. Section 4 delves deeper into opportunities for New Zealand to build resilience.

Section 4: Opportunities to build resilience

New Zealand's historical approach to managing hazards has often been reactive, with a reliance on insurance payouts and government funding to rebuild. This reactive model is not only expensive, it can perpetuate a dangerous cycle: when asset owners expect to be bailed out, they have less incentive to reduce their own risks.[45] This results in more New Zealanders remaining, building and investing in harm's way.

Enquiries and reports have pointed out that New Zealand is not well prepared for large hazards. When something major happens, such as a flood, earthquake or pandemic, the recovery is often ad hoc. This approach is costly and can cause delays and uncertainty, and added stress for communities, making it hard for people to plan.[46,47]

Taking a proactive approach is more cost-effective, saves lives and better protects homes, businesses and public assets. It also unlocks long-term benefits – from stronger communities and healthier ecosystems to a more resilient and adaptable economy.[48]

There are a range of options that would allow New Zealand to build on existing resilience-enhancing efforts and create a more resilient future. This section explores how New Zealand could invest in a better understanding of hazards, prioritise efforts on the most consequential hazards, enhance community resilience, harness the opportunities of AI, invest in more resilient infrastructure, and consider new approaches to better capture the full value of resilience.

Existing work is building momentum

New Zealand is already taking important steps toward a more resilient future. Recent government efforts reflect a growing recognition that resilience is central to economic security and wellbeing. The following initiatives are not just policy responses – they are economic enablers.

- Delivery of the **National Risk and Resilience Framework** across government is driving a more strategic and proactive approach to risk management across all of New Zealand's National Risks (significant hazards and national security threats).[49] This includes knowing what risks we face as a nation, what we are doing well and not well in managing them and taking steps to improve. It also involves having clear roles and responsibilities and governance in place so that government can take effective coordinated action, and government departments know what is expected of them before, during and after crises and/or emergencies. Delivery of the Framework over the next year will focus on three priority actions: planning and preparing for catastrophic risks, reducing risk through cost-effective interventions, and strengthening accountabilities.[viii] The Framework aligns with the Government's focus on driving economic growth and protecting public safety by reducing New Zealand's vulnerability to the harm and cost of its National Risks while protecting New Zealand's safety, security and future prosperity.
- The **National Adaptation Plan**[50] and **National Adaptation Framework**[51] help New Zealand adapt to the worsening impacts of climate change. The 2022 National Adaptation Plan outlines how New Zealand will respond to climate risks across infrastructure, communities

[viii] More information can be found at https://www.dpmc.govt.nz/our-programmes/risk-and-resilience/national-risk-and-resilience-framework.

the economy and the environment. The National Adaptation Framework, announced in October 2025, provides more clarity on the Government's long-term approach to adaptation. The National Adaptation Framework covers risk and response information sharing, roles and responsibilities, investment in risk reduction and cost-sharing pre- and post-event...

- **New Zealand's Emergency Management System**[52] is undergoing significant improvements in response to the findings of the 2023 North Island Severe Weather Events Inquiry. These include reforms currently in progress, with the Government intending to introduce and pass a new Emergency Management Bill in this term of Parliament, alongside a government-endorsed investment and implementation roadmap. Together, these efforts aim to enhance the coordination, speed and effectiveness of emergency responses across the country.
- **The Resource Management Act** (RMA) has recently been amended to strengthen how New Zealand manages natural hazard risks through land-use planning. These legislative changes are being complemented by the development of a new **National Policy Statement for Natural Hazards** (NPS-NH), which is expected to come into force in late 2025. The NPS-NH will provide national direction to help councils make more robust, risk-based decisions about where development should occur and how it can be designed to better withstand natural hazards.
  - Recent changes to the RMA include an emergency response regulation making power. This provision enables regulations to be made by the Government for the purposes of responding to natural hazard events (or other emergencies) and enabling recovery efforts. These regulations may make certain short-term changes to the RMA or plans under the RMA to support recovery. Previously, bespoke legislation was required to enable such temporary changes, such as the Severe Weather Emergency Recovery Legislation Act 2023 following the North Island severe weather events.
  - The NPS-NH is expected to serve as a building block for further improvements to how natural hazard risks are managed under the new resource management system, which will replace the RMA with new legislation in 2026. Notably, "adapting to the effects of climate change and reducing the risks from natural hazards" has been confirmed by Cabinet as a core objective of the wider resource management reform.
- **Pandemic preparedness**[53] A whole-of-government work programme is underway to strengthen New Zealand's preparedness for, and responses to, future pandemic threats and significant communicable disease outbreaks. This work is informed by the Phase One findings of New Zealand's Royal Commission of Inquiry into COVID-19 Lessons Learned, with Phase Two insights to be incorporated once available, alongside other learnings on how to best prepare for future health threats. It involves a range of activities, including the development of a pandemic strategic framework to guide pandemic planning across government, implementing the new public health surveillance strategy, reviewing legislation to ensure it remains fit for purpose for pandemic events and engaging in international efforts to strengthen global pandemic preparedness.
- The **Natural Hazards Portal** provides property-level risk information and tools to support individual and community decision-making.[54]

Many other areas of government work also look to enhance New Zealand's resilience. To truly embed resilience, it is important to look beyond short-term political cycles. While governments naturally respond to immediate priorities, resilience-building benefits most from non-partisan long-term thinking and continuity. Achieving lasting impact requires broad community commitment to strategies that can be sustained over decades. Embedding resilience into core government functions, investment planning and public engagement – regardless of who is in

office – will help ensure that New Zealand is well prepared for future challenges and opportunities.

It is not just central government taking action. Councils and local government are also taking important steps to improve their community's resilience by incorporating local perspectives and knowledge. A critical element of this is the Civil Defence and Emergency Management Groups, which play a key role in on-the-ground actions and linking strategies to tangible outcomes. Across the country, examples include Waikato's regional CDEM Māori Framework – which embeds tikanga and matāuranga Māori in community resilience – and Wellington's focus on community-level plans.

Iwi are also building resilience by proactively incorporating local knowledge, mātauranga and a te ao Māori perspective into their planning. Examples of where this is happening include Tainui's resilience strategy[55], the Maketu iwi collective's climate plan[56], Ngāti Rārua's climate strategy[57] and Takapūwahiā marae working with science agencies to inform their planning and preparedness to hazards.[58]

Taken together, this work generates valuable momentum for building a more resilient New Zealand. Sustaining these efforts and scaling them will be an important part of ensuring a safer and more prosperous future.

Fostering community solutions

Community-led resilience

Resilience starts with people. Strong, connected communities – of individuals who know how to prepare and respond in a crisis – are a pillar of a resilient nation. Giving effect to a whole-of-society approach, where responsibility is shared by every individual, is essential. This can begin with simple steps, like making sure everyone understands the hazards we face and what actions they may need to take in a crisis. Effective resilience building requires listening to voices across our communities and designing solutions that work for everyone. Māori, people living with disability and those in isolated communities may face unique risks. This means tailoring support to different needs and ensuring no one is left behind.

Communities have a strong interest in being involved in the resilience decision-making process, as this can better incorporate the specific forces relevant to each area, a community's risk tolerance and the price they are willing to pay. Doing so may require innovative ways of taking these viewpoints into account. One example of this was the Citizens Assembly on the next source of water for Auckland, which saw a representative sample of Aucklanders consider different options to meet future water supply, with their recommendations going alongside technical reports.[59] Such options for deliberative democracy could be one way to develop solutions that work for a wider range of people, and to address hard-to-answer questions.

Practical support and community empowerment

Investing in community emergency hubs – such as schools, marae and other public buildings – can significantly enhance community resilience.

By outfitting these key locations with essential supplies and equipment, such as solar panels, battery and water storage, and satellite communication equipment, communities can better live through disruption from hazard events and support each other during a crisis.

While solar panels alone can help reduce a building's everyday energy costs, pairing them with battery and water storage and satellite communications ensures these hubs can serve as safe

emergency shelters with lighting, heating, refrigeration and reliable communications when communities need them most. This kind of focused planning is a cost-effective, high-impact way to mitigate the effects of hazards and build a more resilient New Zealand.

Learning from international models

New Zealand can also learn from international examples of all-of-society approaches. In response to growing security concerns, Sweden has revitalised its total defence concept – increasing budgets for civil and military preparedness, clarifying roles and responsibilities, and emphasising the importance of stockpiling essential supplies. Public awareness is central to this approach. Sweden has distributed a national brochure to every household, offering practical checklists and guidance on how to prepare for events like armed conflict or severe weather.[60] This communication reinforces the expectation that every citizen has a role to play in national resilience.

The United Kingdom's Strategic Defence Review echoes this approach[61]. It includes a two-year programme of public outreach to explain current threats, future trends and the role of society in national defence. It also highlights the importance of public–private cooperation to protect critical infrastructure and improve readiness – including through legislation and better use of reserve forces.

While these strategies reflect different national contexts, the core lesson is universal: public engagement is essential to national resilience. New Zealand could adopt a similar approach to those described above – distributing a national preparedness guide tailored to our unique hazard landscape and launching a public outreach campaign to build awareness and capability through relevant channels and platforms.

Using science, data and modelling

Understanding hazards and their effects

Understanding the hazards we face is the first step towards building resilience. Without a clear picture of the hazards we face, it is difficult to plan, prioritise or act effectively. Science and data are essential to New Zealand better understanding how to prepare for and proactively manage hazards.

New Zealand has already made progress. Tools like RiskScape,[62] future sea-level-rise maps and climate projections are helping to visualise and quantify risk. A major step forward is the Natural Hazards and Resilience Platform,[63] which brings together researchers, practitioners and communities to improve how we understand, manage and communicate natural hazard risks. The platform focuses on delivering science that is directly usable by decision-makers – from local councils to infrastructure providers – and supports a more integrated, systems-based approach to resilience.

However, making decisions in this space is rarely straightforward. Evidence is often lacking, inconclusive or inaccessible, especially when it comes to identifying which resilience measures will work best in different contexts. This uncertainty should not prevent action, but it does mean we need to monitor, learn and adapt as we go. Building resilience requires a mindset of continuous improvement, where decisions are informed by the best available data, but also flexible enough to evolve as new insights emerge.

Opportunities to improve understanding

To build on this foundation, New Zealand has several key opportunities – namely, to:

- make hazard risk data more accessible, through improved data-sharing platforms and agreements
- improve the quality and usability of data, by developing clear standards and consistent methods for data collection, generation and application
- grow technical expertise and risk-communication capability, including by integrating diverse knowledge systems – such as science and mātauranga Māori – and building the skills to translate complex data into actionable insights.

Realising these opportunities will require increased and sustained investment, but the payoff is significant: better decisions, more targeted investments and a stronger, more informed public.

Harnessing technology and AI

AI is rapidly emerging as a powerful tool in building resilience to hazards. AI is helping to shift hazard management from reactive to proactive, enabling smarter, faster and more inclusive approaches to risk anticipation, impact assessment and response planning.

Anticipating hazards

AI is transforming how to detect and anticipate hazard events, often before they escalate. These innovations are helping to move from reactive to proactive hazard management. Tools like QuakeFlow analyse seismic data to detect tiny tremors that traditional systems miss, offering early insights into fault stress and potential earthquake activity.[64] Smartphone-based earthquake alerts, such as Google's Android system use crowdsourced data to detect shaking and send out warnings within seconds.[65]

AI also enhances tsunami forecasting by rapidly processing seismic and oceanographic data[66], and monitors volcanic activity by scanning satellite and ground data to detect subtle land movements that may signal an impending eruption.[67]

In the health domain, AI supports early disease surveillance by analysing environmental and health data to detect early signs of outbreaks, supporting faster public health responses.[68,69]

Understanding impact

Before events occur, AI can assess factors like building age, construction quality, soil type and proximity to fault lines to identify high-risk areas and inform urban planning.[70] AI-powered climate projections enhance risk assessment by generating localized forecasts that help identify vulnerabilities and guide targeted resilience planning.[71]

After disasters, AI can analyse satellite imagery and drone data to rapidly assess damage to buildings and infrastructure, guiding emergency response.[72] In search and rescue operations AI-powered sound analysis can distinguish human calls for help from background noise, guiding rescue teams searching through rubble.[73]

Enabling people and systems

AI can also help to strengthen the systems and services that support hazard resilience.[74] Together, these applications help ensure that both people and systems are ready to respond effectively when hazards strike. Digital twins – virtual models of real-world environments like

transport networks or urban areas – allow planners to simulate disaster scenarios, test resilience strategies and make informed decisions, as seen in earthquake response efforts in Türkiye[75] and flood-ready infrastructure in the United States.[76]

These tools can also support cross-agency planning and community engagement by visualising local risks and fostering collaborative decision-making. AI enhances this capability by translating complex hazard data into plain language, delivering tailored messages to diverse communities and improving access to trusted information through inclusive tools like chatbots and voice assistants.

These innovations align with the Public Service Commission's goals for digital transformation and smarter, user-centred public services.[77] As AI capabilities grow, New Zealand must consider how to harness these technologies across sectors to ensure readiness and resilience in the face of future hazards.

Designing more resilient infrastructure

Resilient infrastructure is critical to ensure people are safe, can access essential goods and services and that the economy can handle disruptions.[ix] However, New Zealand faces a significant infrastructure deficit.[x] If current trends continue, the shortfall is projected to reach $210 billion by 2050.[78] Addressing this infrastructure deficit in a fiscally responsible way will require innovation – not only in the types of infrastructure we build, but also in the frameworks we use to prioritise, evaluate and deliver investment.

A resilience-focused approach means planning for a range of hazards – such as floods, droughts or pandemics – by prioritising infrastructure like flood protection and water storage that safeguard both communities and food production. It also means strengthening the systems that keep food supply chains running during crises, recognising these as critical lifelines. A resilience-focused approach could also see an emphasis on developing backup infrastructure that can function when primary systems fail. This could include distributed food production, local energy generation and resilient inter-island shipping.

Designing and building more resilient infrastructure means embracing the full spectrum of options available. These include using advanced materials, integrating technology to monitor infrastructure performance, rethinking how maintenance is planned and delivered, and designing systems that can be upgraded over time. Resilience must be built into infrastructure from the outset – not added as an afterthought. Two specific examples of resilient infrastructure are discussed below.

Nature-based solutions

One approach is the use of nature-based solutions – infrastructure that blends natural systems with green technology to reduce risk, restore ecosystems and strengthen community resilience. These solutions can be more cost-effective than traditional infrastructure, particularly in reducing flood risk, and often come with a range of co-benefits.[79]

Examples include engineered wetlands to manage stormwater, afforestation to stabilise landscapes, and urban features like green roofs and rain gardens. These approaches not only reduce hazard impacts but also improve biodiversity, air and water quality, and community

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[ix] The New Zealand Infrastructure Commission is the Government's independent advisor on infrastructure. It released a draft National Infrastructure Plan that the Government will respond to in 2026.

[x] The gap between the existing state of infrastructure and the level of infrastructure needed to adequately support the population, economy and public services.

wellbeing. In New Zealand, there is a unique opportunity to develop nature-based solutions informed by mātauranga Māori, ensuring they are well integrated into the landscape and deliver broader cultural and environmental benefits.[80]

Nature-based, or green-blue solutions can have a direct impact on the safety and wellbeing of New Zealanders. This includes the Te Ararata project in Auckland, developed by Auckland Council as part of their Making Space for Water programme that was co-funded with central government after the North Island Weather Events.[81] This project includes work on a series of waterways and parks that allows room for flooding – undertaken alongside purchasing and removing houses that were most at risk, and a stream restoration pilot project.

Battery storage

A reliable electricity supply is critical to New Zealand's resilience. It powers essential services, supports economic activity and enables communities to function during crises. As climate-related disruptions become more frequent, targeted investment in energy infrastructure – particularly battery energy storage systems (BESS) – offers a powerful way to strengthen resilience while delivering everyday benefits.

BESS range in size from small residential units to large, utility-scale systems. They can stabilise the grid, reduce energy costs and provide backup power during emergencies. A leading example of a large-scale system is the Hornsdale Power Reserve in South Australia, which was built in response to a state-wide blackout caused by severe weather. In its first two years of operation, it helped reduce power prices by an estimated AU$150 million and provided critical support when South Australia was temporarily disconnected from the national grid.[82]

New Zealand is beginning to follow suit with large systems like the one recently opened in Ruakākā, which will enhance energy resilience in Northland – a region that has experienced repeated disruptions.[83] Additional measures are also under investigation, including the potential for Northland to operate as an energy 'island' – running independently from local supply for up to three days if the national grid is compromised.

Smaller, local battery storage systems, such as those in homes, could also deliver significant advantages in a crisis and be deployed more quickly. For individual households, a home battery could enable them to keep food chilled, cook meals and communicate when paired with satellite internet. Crucially, it would also reduce the demand on emergency and medical services by supporting medically dependent households that rely on electricity for devices like home dialysis and breathing support.

These investments demonstrate how energy resilience can be built into the system at multiple scales – from individual homes to regional networks – not only to respond to emergencies, but also to improve performance, reduce costs and support regional development every day.

Funding and investment strategies

Funding and investment strategies

New Zealand has finite national resources and always aims for its investments to provide the best return possible. One way to unlock greater value from resilience investment is to prioritise measures that reduce the impact of the most damaging potential hazards.

Although there is a broad consensus that proactive investment in resilience delivers positive outcomes, deciding where and how to invest for the greatest return is complex. Hazards are inherently uncertain – we do not always know where and when they will strike. Infrastructure

systems are interconnected, and the costs of resilience are often shared across central and local government, the private sector and communities. These factors can make traditional cost-benefit analysis difficult to apply.[84]

Balancing affordability and equity is also critical. Careful consideration must be given to how the costs and benefits of resilience initiatives are distributed. This means weighing public and private benefits, to avoid placing disproportionate burdens on vulnerable communities or future generations. Achieving sustainable resilience requires a clear understanding of the long-term economic returns on investment, ensuring efforts are both impactful and financially viable across society.

New approaches to valuing resilience

To address the complexity of valuing resilience, new approaches are emerging that better capture its full worth, including intangible benefits like avoided disruption, social cohesion, long-term confidence and avoiding potential maladaptation.[xi] Examples of such approaches are described below.

- One approach is the **'triple dividend of resilience'**, which measures how resilience investments can deliver three types of benefit: avoiding losses, unlocking economic opportunities and delivering wider benefits.[85] This approach highlights the value of acting early, even if a disaster does not happen right away. For example, building protection for a coastal town might not only safeguard homes, but also boost tourism and attract new investment by giving people more confidence in the area's future.[86]
- Other methods include additional decision-support tools such as multi-criteria analysis or scenario planning. More complex **tools, like the New Zealand-developed MERIT** – a dynamic economics model – can be used to test the economic consequences of different resilience-building measures.[87]
- Australia has developed broad frameworks like the **'Enabling Resilience Investment Framework'**,[88] which can be used to create place-based risk mitigation options. Australia has also developed hazard-specific models. In addition, **Queensland's Economic Assessment Framework** of Flood Risk Management Projects was developed to compare and prioritise flood risk management projects.[89]

These tools highlight the opportunity for New Zealand to use existing knowledge and improved data to make smarter, more transparent investment decisions – and to ensure that resilience is not just a cost, but a catalyst for long-term value.

[xi] Maladaptation is where actions taken to increase resilience inadvertently result in more significant negative consequences – for example, a seawall is built to protect homes against high tides and storms, but acts as a dam for stormwater and flooding.

Section 5: Closing remarks

New Zealand faces growing challenges from hazards, but our resilience efforts are not starting from scratch. Across government, communities, iwi, businesses and science, momentum is building. We are developing better tools and information, smarter policies and stronger partnerships. We are learning from past events and preparing for those yet to come.

However, national resilience is a long game. It requires sustained investment, strategic long-term thinking, working together, and the courage to make difficult decisions today for a safer and more prosperous tomorrow.

Enhancing our national resilience will help us mitigate the consequences of disasters, and capture an array of economic, social and environmental benefits. It will give our people and economy the opportunity to thrive – not just when conditions are easy, but also when they are hard.

Achieving a more resilient future will demand a broad approach. It will include investing in robust infrastructure that can withstand disruptions, fostering communities that are equipped to support one another, and harnessing the power of new technologies to help us anticipate and adapt to change.

But national resilience is not just about large-scale investments; it also demands that everyone plays their part. Every individual has a crucial role in national resilience, whether through assembling an emergency kit, knowing evacuation routes, participating in community preparedness planning, or making informed choices above where they live. When each of us contributes, we collectively build a better future for all.

Annex 1: National Risk Register 2025

National Risks	Description (website)
Act of foreign interference or espionage targeting New Zealand	Foreign interference is defined as an act by a foreign state, or its proxy, that is intended to influence, disrupt or subvert a New Zealand national interest by deceptive, coercive or corruptive means. By its nature, foreign interference can be difficult to discern and can take many forms (eg, control or harassment of communities that whakapapa to foreign states, foreign information manipulation and interference, or cultivating relationships of influence or dependence that can be leveraged, such as with government officials).
Armed conflict	Armed conflict can be broadly understood as situations in which two or more opposing groups (either state actors or non-state actors) use organised armed violence to pursue their objectives at the expense of others. New Zealand's interests can be put at risk by a wide range of actual and potential armed conflicts. This risk focuses on armed conflicts the New Zealand Government decides to commit national capabilities to protect, preserve and promote our interests to, particularly including the New Zealand Defence Force.
Communicable disease outbreak	Communicable diseases are diseases that spread from one person to another or from an animal to a person. Communicable disease outbreaks, particularly epidemics or pandemics, can result in large-scale health emergencies.
Deliberate interference, disruption or destruction of space assets, infrastructure or services upon which New Zealand relies	Deliberate interference, disruption or destruction of space assets, infrastructure (whether space or ground-based) or services can threaten the essential services that underpin our daily life – such as communications, navigation and financial transactions – and undermine our national security interests. Disruption or destruction can occur from remote or direct physical interference with space systems through a range of means, including active targeting.
Drought	Drought is an extended period of unusually dry conditions or below normal rainfall affecting plant growth, and food and fibre production.
Earthquake	An earthquake is a natural event caused by the release of strain energy in the Earth's crust, resulting in strong and sometimes extremely violent ground shaking. Secondary effects can include landslides, liquefaction, building collapse, fire and tsunami.
Failure or disruption of a major financial mechanism or institution	The failure or disruption of a major financial mechanism or institution (such as a major registered bank or large insurer), resulting in a sudden loss of a large portion of its nominal value, causing disruption to the provision of credit, transactional banking, insured risks or the payment and settlement process.
Major cyber incident	A major cyber incident is an activity or event that threatens or affects the confidentiality, availability and integrity of New Zealand's data and information infrastructures. Threats can come from malicious, state-sponsored actors, as well as organised criminal groups and individuals.
Major maritime security incident	A major maritime security incident refers to illegal or unwelcome behaviour in New Zealand's maritime area of interest by a state or non-state actor that threatens New Zealand's maritime interests. This includes deliberate territorial incursions and other non-approved activities, such as resource exploitation.
Major threat to Pacific regional stability	New Zealand's national security relies on a stable, resilient and prosperous Pacific. Instability in the region – whether due to social, political, economic or environmental drivers – is likely to require deployment of New Zealand capabilities to preserve and protect our regional, bilateral and national interests and obligations.

National Risks	Description (website)
Major trade disruption	Trade disruption occurs when barriers arise preventing or reducing New Zealand traders' access to export markets for goods and services and/or hindering access to critical imports. Many natural, economic and political factors could cause this, including market access risks, biosecurity threats, a major shock to multiple countries such as a pandemic, global financial crisis or armed conflict, and risks to the safe transport of goods to and from New Zealand.
Maritime mass arrival	A mass arrival is when over 30 people, who do not have permission to enter New Zealand, arrive on board one craft or more at the same time, excluding scheduled international services.
Pest or disease incursion	An incursion by an agricultural, environmental or aquatic pest or disease-causing organism, or their vectors, presenting a biosecurity risk to New Zealand.
Radiological substance incident	A radiological or hazardous substance incident refers to an unplanned or uncontrolled release of hazardous material (such as chemical agents, corrosive materials, explosives, flammable gases/liquids, non-flammable gases, organic peroxides, oxidisers, radioactive material, toxic and infectious substances and unexploded ordinances) that could have adverse effects on people, property and the natural environment.
Severe weather and flooding	Severe weather refers to the occurrence of strong winds (including tornadoes) and/or heavy or prolonged rain and/or snow and/or coastal storm surges. Severe weather can cause flooding and landslides.
Significant disruption or failure of critical infrastructure	Significant disruption to, or loss of: • water infrastructure or services. This includes impacts to drinking water and wastewater networks and services • telecommunications major infrastructure or services. This includes impacts to our satellite, telephone and radio communications • transport infrastructure or services. This includes impacts to transport physical infrastructure and assets, networks, enabling services, operators and systems that underpin regional, national and international connectivity and accessibility • energy infrastructure or services. This includes impacts to electricity, natural gas, and liquid fuel supplies.
Space weather	Space weather refers to variable conditions on the sun and in the space environment that can impact Earth's magnetic field. A space weather event can cause severe geomagnetic disturbance that could negatively impact information and communications technology, global navigation satellite systems and other critical infrastructure.
Technological disruption due to adoption or misuse of emerging, critical and sensitive technologies (ECST)	ECST captures a range of technology areas, including artificial intelligence (AI), autonomous systems, biotechnologies and quantum technologies. While ECST can bring significant benefits to New Zealand's economy, national security and wellbeing, their adoption and potential misuse can pose national security and broader ethical concerns. These include: • the use of AI to automate cyberattacks or generate and/or share disinformation • the use of advanced biotechnology for malicious purposes • the use of quantum technology to break current encryption methods • the exploitation of next generation communication networks to intercept or manipulate data.
Terrorist attack	Under New Zealand law, a terrorist act is defined as an ideologically, politically or religiously motivated act – including, but not limited to, those causing death or serious bodily injury – intended to intimidate a population, or to coerce or force the Government to do or not do certain things.

National Risks	Description (website)
Transnational organised criminal activity	Transnational organised crime refers to planned and systematic criminal activity, committed by a group or network, that has the objective of gaining profit, power or influence.
Tsunami	Tsunami is a natural event consisting of a series of waves generated when a large volume of water in the sea, or in a lake, is rapidly displaced. This could be caused by a large submarine or coastal earthquake, underwater or terrestrial landslide, volcanic eruption or meteorite splashdown.
Vector-borne disease outbreak	Vector-borne disease outbreaks relate to the establishment of a competent disease vector (eg, exotic mosquito) followed by transmission of an arboviral disease which in severe cases could have significant impacts on public health.
Violent protest or public disorder event	Significant and persistent unlawful mass disorder/activity arising from an event or mass act of civil disobedience (such as a riot) in which participants may become violent and hostile towards authority and/or their actions impact the functioning of key institutions and infrastructure. This is distinct from lawful protest activity and non-violent civil disobedience, which may have elements of minor short-term disorder or disruption.
Volcanic activity	Volcanic activity includes either a volcanic eruption or sustained levels of volcanic unrest, which may or may not be a precursor to an eruption. Volcanic hazards include ash fall, lava flows, pyroclastic flows (superheated ash and gases), ballistic ejecta, lahars (ash and mudflows) and toxic gas emissions.
Wildfire	Wildfire is an unwanted, uncontrolled fire which occurs within an area of combustible vegetation, often moving rapidly across the landscape. Although wildfires most commonly occur in rural areas, they may also occur within urban environments.

References

1 World Population Review. *Natural Disaster Risk by Country 2025*. Retrieved 28 July 2025.

2 IAG. 2025. *New Zealand Wild Weather Tracker*. Auckland: IAG.

3 Department of Prime Minister and Cabinet. 2024. 2024 National risks public survey significant hazards key findings summary. https://www.dpmc.govt.nz/sites/default/files/2024-09/2024-National-Risks-Public-Survey-Significant-Hazards-Key-Findings-Summary.pdf.

4 Department of the Prime Minister and Cabinet. *New Zealand's National Risks*. Retrieved 7 July 2025.

5 Aotearoa New Zealand Royal Commission of Inquiry into COVID-19 Lessons Learned. 2024. *COVID-19 Lessons Learned Main Report: Part 3 – Moving Forward*. p 170.

6 Aotearoa New Zealand Royal Commission of Inquiry into COVID-19 Lessons Learned. 2024. *COVID-19 Lessons Learned Main Report: Part 3 – Moving Forward*. p 170.

7 AF8 (Alpine Fault Magnitude 8). *What is AF8?*. Retrieved 7 July 2025.

8 Pizer C, Clark K, Howarth J, Garrett E, Wang X, Rhoades D, Woodroffe S. 2021. Paleotsunamis on the Southern Hikurangi Subduction Zone, New Zealand, Show Regular Recurrence of Large Subduction Earthquakes. *The Seismic Record* 1(2): 75–84. https://doi.org/10.1785/0320210012

9 Rhoades DA, Van Dissen RJ, Langridge RM, Little TA, Ninis D, Smith EGC, Robinson R. 2011. Re-evaluation of conditional probability of rupture of the Wellington–Hutt Valley segment of the Wellington Fault. *Bulletin of the New Zealand Society for Earthquake Engineering* 44(2), 77–86. https://doi.org/10.5459/bnzsee.44.2.77-86

10 GNS Science. *Tsunami in New Zealand*. Retrieved 7 July 2025.

11 Taranaki Emergency Management. *Volcanic Activity*. Retrieved 7 July 2025.

12 Deligne NI, Fitzgerald RH, Blake DM, Davies AJ, Hayes JL, Stewart C, Wilson G, Wilson TM, Castelino R, Kennedy BM, Muspratt S, Woods R. 2017. Investigating the consequences of urban volcanism using a scenario approach I: Development and application of a hypothetical eruption in the Auckland Volcanic Field, New Zealand. *Journal of Volcanology and Geothermal Research* 336: 192–208. https://doi.org/10.1016/j.jvolgeores.2017.02.023

13 Deligne NI, Fitzgerald RH, Blake DM, Davies AJ, Hayes JL, Stewart C, Wilson G, Wilson TM, Castelino R, Kennedy BM, Muspratt S, Woods R. 2017. Investigating the consequences of urban volcanism using a scenario approach I: Development and application of a hypothetical eruption in the Auckland Volcanic Field, New Zealand. *Journal of Volcanology and Geothermal Research* 336: 192–208. https://doi.org/10.1016/j.jvolgeores.2017.02.023; Blake DM, Deligne NI, Wilson TM, Lindsay JM, Woods R. 2017. Investigating the consequences of urban volcanism using a scenario approach II: Insights into transportation network damage and functionality. *Journal of Volcanology and Geothermal Research* 340: 92–116. https://doi.org/10.1016/j.jvolgeores.2017.04.010

14 Anticipating future Volcanic Explosivity Index (VEI) 7 eruptions and their chilling impacts | Geosphere | GeoScienceWorld

15 IPCC, 2023. *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. Geneva, Switzerland: IPCC. https://doi.org/10.59327/IPCC/AR6-9789291691647

16 Victoria University of Wellington Chair in the Economics of Disasters and Climate Change. *Whakahura – extreme events and the emergence of climate change*. Retrieved 7 July 2025.

[17] Department of the Prime Minister and Cabinet, National Emergency Management Agency. 2023. *Proactive Release: Briefing to the Incoming Minister for Emergency Management and Recovery (NEMA)*.

[18] *UN News*. 2025. Real cost of disasters is 10 times higher than previously thought, says UN. 27 May 2025.

[19] White A, Comendant C, Yee D, Moore D. 2025. *Natural hazards-related public spending in New Zealand*. Prepared for IAG by Sapere Research Group.

[20] National Institute of Water and Atmospheric Research. *Marine geological hazards*. Retrieved 7 July 2025.

[21] The Observatory of Economic Complexity. *New Zealand*. Retrieved 7 July 2025.

[22] Harvard Growth Lab, *Country and Product Complexity Rankings*. Retrieved 7 July 2025.

[23] Lu B. 2023. Developments in the agricultural sector. In: Reserve Bank of New Zealand. *November 2023 Financial Stability Report*. 26 October.

[24] Melia N, Dean S, Pearce HG, Harrington L, Frame DJ, Strand T. 2022. Aotearoa New Zealand's 21st-Century Wildfire Climate. *Earth's Future* 10(6): e2022EF002853. https://doi.org/10.1029/2022EF002853

[25] Department of Conservation. 2020. *Biodiversity in Aotearoa: an overview of state, trends and pressures 2020*. Wellington: Department of Conservation.

[26] Reserve Bank of New Zealand. 2021. *Climate Changed: 2021 and Beyond*. Wellington: Reserve Bank of New Zealand; The Treasury, Ministry for the Environment. 2023. *Ngā Kōrero Āhuarangi Me Te Ōhanga: Climate Economic and Fiscal Assessment 2023*. Wellington: The Treasury.

[27] National Institute of Water and Atmospheric Research. *Climate change and possible impacts for New Zealand*. Retrieved 7 July 2025.

[28] Population Reference Bureau. *Projected Population mid-2035 (millions)*. Retrieved 7 July 2025; Te Ara Ahunga Ora | Retirement Commission. *Older People*. Retrieved 7 July 2025; Worldometer. *New Zealand Population (Live)*. Retrieved 7 July 2025.

[29] Tuohy RJ. 2010. *Improving disaster preparedness of older adults living in the community*. GNS Science Report 2010/07. Institute of Geological and Nuclear Sciences Limited; Social Wellbeing Agency. 2023. *Older people experiencing vulnerability and multiple disadvantage in New Zealand: A report on the needs of older people (65+) in health, housing, finance, social connection, and access*. Wellington: Social Wellbeing Agency | Toi Hau Tāngata, Ministry of Social Development.

[30] Uitto JI. 1998. The geography of disaster vulnerability in megacities: A theoretical framework. *Applied Geography* 18(1): 7–16. https://doi.org/10.1016/S0143-6228(97)00041-6; Xu J, Wang Z, Shen F, Ouyand C, Tu Y. 2016. Natural disasters and social conflict: A systematic literature review. *International Journal of Disaster Risk Reduction* 17: 38–48. https://doi.org/10.1016/j.ijdrr.2016.04.001

[31] GNS Science. 2025. Planning for Extreme Wildfire. GNS Science Policy Brief 2025/01. Retrieved 10 September 2025.

[32] Environmental Health Intelligence New Zealand. 2024. *Social vulnerability to the impacts of climate-related hazards in Aotearoa New Zealand*. Prepared for He Pou a Rangi Climate Change Commission by Environmental Health Intelligence New Zealand, Massey University.

[33] European Commission. *Information manipulation and misinformation. A threat for EU civil protection and humanitarian aid*. Retrieved 7 July 2025.

[34] United Nations Office for Disaster Risk Reduction. 2017. *Words into Action Guidelines: National Disaster Risk Assessment. Governance System, Methodologies and Use of Results*; Organisation for

Economic Co-operation and Development. 2022. *The Impact of Natural Hazards on Hazardous Installations*.

35 Noy I. 2025. NZ has no dedicated database to track losses from weather disasters – without it, we're planning i Noy I. 2025. NZ has no dedicated database to track losses from weather disasters – without it, we're planning in the dark*. The Conversation*. 18 March. n the dark*. The Conversation*. 18 March.

36 New Zealand Government. 2024. *Environment Committee Inquiry into Climate Adaptation: Summary of Submissions*. Wellington: New Zealand Government.

37 Office of the Prime Minister's Chief Science Advisor. 2016. *Making decisions in the face of uncertainty: Understanding Risk, Part 1, May 2016*. Auckland: Office of the Prime Minister's Chief Science Advisor.

38 Natural Hazards Commission | Toka Tū Ake. Natu*ral Hazards Portal: Natural hazards in your area*. Retrieved 7 July 2025.

39 Nicholls K, Yankanna A, Nguyen C, Wild D. 2024. General Insurance Industry Stress Test Results. *Reserve Bank of New Zealand Bulletin* 88(2): 1–25; Carvalho PA, Baker B, Farquharson A. 2022. *Housing as an Investment Asset in New Zealand: Looking at risk-adjusted portfolio choices*. Reserve Bank of New Zealand Analytical Note Series. Wellington: Reserve Bank of New Zealand.

40 Newton K. 2024.Treasury data shows insurers honing in on flood-risk properties. *RNZ* 24 July; Insurance Council of New Zealand. 2025. *Annual Review 2024*.

41 Ministry for the Environment. 2025. A proposed approach for New Zealand's adaptation framework. Wellington: Ministry for the Environment.

42 Storey B, Owen S, Noy I, Zammit C. 2020. *Insurance Retreat: Sea level rise and the withdrawal of residential insurance in Aotearoa New Zealand*. Prepared for the Ministry of Business, Innovation and Employment through the Deep South National Science Challenge.

43 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

44 The future of insurance cover for weather-related natural disasters. In: MinterEllisionRuddWatts *Cover to Cover* Issue 29. pp 17–19.

45 HM Treasury. 2020. *Government as insurer of last resort: managing contingent liabilities in the public sector*. United Kingdom: HM Treasury.

46 Including but not limited to: Department of Internal Affairs. 2024. *Report of the Government Inquiry into the Response to the North Island Severe Weather Events*. Wellington: Department of Internal Affairs; Ministry of Civil Defence. 2017. *Ministerial Review: Better Responses to Natural Disasters and Other Emergencies in New Zealand*. Wellington: Department of the Prime Minister and Cabinet; Ministerial Inquiry into Land Uses in Tairawhiti and Wairoa. 2023. *Outrage to optimism: Report of the Ministerial Inquiry into land uses associated with the mobilisation of woody debris (including forestry slash) and sediment in Tairawhiti/Gisborne District and Wairoa District*. Wellington: Ministry for the Environment; Bush International Consulting. 2023. *Auckland flood response review: Independent, external review of events, January 27–29, 2023*. Auckland: Auckland Council; Bush International Consulting. 2024. *Hawke's Bay Civil Defence and Emergency Management Group Response to Cyclone Gabrielle*. Hawke's Bay: Hawke's Bay Emergency Management; Royal Commission of Inquiry into COVID-19 Lessons Learned. 2024. *COVID-19 Lessons Learned Main Report*. Wellington: Royal Commission of Inquiry into COVID-19 Lessons Learned; Review into the Future for Local Government. 2023. *He piki tūranga, he piki kōtuku – The future for local government*. Wellington: Department of Internal Affairs; National Emergency

Management Agency. 2024. *2023 North Island Severe Weather Events: NEMA's Internal Operational Lessons Report*. Wellington: National Emergency Management Agency.

47 Insurance Council of New Zealand. *Cost of natural disasters*. Retrieved 7 July 2025.

48 Sharifi A. 2021. Co-benefits and synergies between urban climate change mitigation and adaptation measures: A literature review. *Science of the Total Environment* 750: 141642. https://doi.org/10.1016/j.scitotenv.2020.141642

49 For more information, see Department of the Prime Minister and Cabinet. *National Risk and Resilience Framework*. Retrieved 7 July 2025.

50 For more information, see Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan.* Wellington: Ministry for the Environment.

51 For more information, see Ministry for the Environment. *Adaptation framework*. Retrieved 7 July 2025.

52 For more information, see Department of the Prime Minister and Cabinet. 2024. *Strengthening disaster resilience and emergency management*. Wellington: Department of the Prime Minister and Cabinet.

53 For more information, see Ministry of Health. 2024. *New Zealand Pandemic Plan: A framework for action*. Wellington: Ministry of Health.

54 Natural Hazards Commission | Toka Tū Ake. *Natural Hazards Portal: Home*. Retrieved 7 July 2025.

55 https://waikatotainui.com/wp-content/uploads/2020/11/FY21-Amohia-Ake-WT-Iwi-Resilience-Plan-Final-ext.pdf.

56 https://maketuclimateplan.iwi.nz/wp-content/uploads/2023/11/Maketu-Climate-Change-Adaptation-Plan-He-Toka-Tu-Moana-Mo-Maketu.pdf.

57 https://www.ngatirarua.iwi.nz/content/files/2025/01/Nga-ti-Ra-rua-Climate-Strategy.pdf.

58 https://www.gns.cri.nz/news/iwi-partnership-protects-community-from-natural-hazards.

59 Auckland Council. 2022. Watercare Citizens' Assembly. What should be the next source (or sources) of water for Auckland? https://www.knowledgeauckland.org.nz/publications/watercare-citizens-assembly-what-should-be-the-next-source-or-sources-of-water-for-auckland/.

60 The Swedish Civil Contingencies Agency. 2024. *In Case of Crisis and War*. Sweden: MSB.

61 United Kingdom Ministry of Defence. 2025. *Strategic Defence Review, Making Britain Safer: secure at home, strong abroad*. United Kingdom: Ministry of Defence.

62 National Institute of Water and Atmospheric Research, Institute of Geological and Nuclear Sciences Ltd. *RiskScape*. Retrieved 7 July 2025.

63 GNS Science. *Natural Hazards and Resilience Platform*. Retrieved 7 July 2025.https://www.gns.cri.nz/research-projects/natural-hazards-and-resilience-platform/.

64 *Reuters*. 2025. AI is shaking up the hidden world of earthquake forecasting. 1 April 2025.

65 Google Crisis Response. *Android early earthquake warnings*. Retrieved 7 July 2025.

66 Innoreports. Science & Tech. 2023. *AI-Powered Tsunami Early Warning System Enhances Safety*. Retrieved 7 July 2025.

67 Liu X, Zhang Y, Shan X, Wang Z, Gong W, Zhang G. 2025. Deep Learning for Automatic Detection of Volcanic and Earthquake-Related InSAR Deformation. *Remote Sensing* 17(4): 686. https://doi.org/10.3390/rs17040686

[68] Suvvari TK, Kandi V. 2024. Artificial intelligence enhanced infectious disease surveillance - A call for global collaboration. *New Microbes and New Infections* 62: 101494. https://doi.org/10.3390/buildings14103255

[69] MacIntyre CR, Limitation S, Quigley A. 2022. Preventing the next pandemic: Use of artificial intelligence for epidemic monitoring and alerts. *Cell Reports Medicine* 3(12): 100867. https://doi.org/10.1016/j.xcrm.2022.100867

[70] Alzahrani, A. & Alshammari, M. 2024. Artificial intelligence in earthquake-resilient building design: A systematic review. Buildings, 14(10) 3255. AI-in-Risk-Assessment-and-Disaster-Preparedness-for-Building-Structures.pdf.

[71] National Institute of Water and Atmospheric Research. *High-resolution climate projections using physics and AI*. Retrieved 7 July 2025; Riedel K. 2024. *Impact-based forecasts and warnings*. Prepared for the Ministry of Business, Innovation, and Employment by NIWA through the Resilience to Nature's Challenges – Kia manawaroa – Ngā Ākina o Te Ao Tūroa National Science Challenge.

[72] Estêvão JMC. 2024. Effectiveness of Generative AI for Post-Earthquake Damage Assessment. *Buildings* 14(10): 3255. Effectiveness of Generative AI for Post-Earthquake Damage Assessment.

[73] Premachandra C, Kunisada Y. 2023. GAN Based Audio Noise Suppression for Victim Detection at Disaster Sites With UAV. *IEEE Transactions on Services Computing* 17(1): 183–193. http://dx.doi.org/10.1109/TSC.2023.3338488

[74] Ministry of Business, Innovation & Employment. 2025. *New Zealand's AI Strategy: Investing with confidence*. Retrieved 8 July 2025.

[75] Korkmaz M, Zulfikar AC, Demirkesen S. 2024. Leveraging Digital Twins as a Common Operating Picture for Disaster Management: Case of Seismic Hazards. *International Journal of Geo-Information* 13(12): 430. https://doi.org/10.3390/ijgi13120430

[76] Razavi H, Titidezh O, Asgary A, Bonakdari H. 2024. Building Resilient Smart Cities: The Role of Digital Twins and Generative AI in Disaster Management Strategy. In: S Pourroostaei Ardakani, A Cheshmehzangi (eds) *Digital Twin Computing for Urban Intelligence*. Urban Sustainability. Singapore: Springer. pp 95–118. https://doi.org/10.1007/978-981-97-8483-7_5

[77] Digital.Govt.NZ. *Public Service AI framework*. Retrieved 8 July 2025.

[78] Hon Chris Bishop. 2025. Speech to NZ Infrastructure Investment Summit. *Beehive.govt.nz* 13 March.

[79] Griffiths J, Semadeni-Davies A, Borne K, Tanner C. 2024. *Nature-based solutions for flood management: Literature Review*. NIWA report prepared for Envirolink. Christchurch: Envirolink.

[80] Boffa Miskell Ltd. 2024. *Nature-based Solutions for Climate Adaptation: Roadmap for scaling use in Aotearoa New Zealand*. Prepared for the Ministry for the Environment by Boffa Miskell Ltd.

[81] Auckland Council. 2025. https://ourauckland.aucklandcouncil.govt.nz/media-centre/2025/april/ground-broken-on-the-first-making-space-for-water-flood-resilience-projects/

[82] Aurecon. *Hornsdale Power Reserve.* Retrieved 7 July 2025.

[83] Meridian Energy. *Completion of Ruakākā Battery Energy Storage System*. Retrieved 7 July 2025.

[84] Wise RM, Capon T, Lin BB, Stafford-Smith M. 2022. Pragmatic cost-benefit analysis for infrastructure resilience. *Nature Climate Change* 12: 881–883. https://doi.org/10.1038/s41558-022-01468-5

[85] Tanner T, Reid RCJ, Wilkinson E, Rajput S, Surminski S, Maruyama Rentschler JE. 2018. *The triple dividend of resilience: realizing development goals through the multiple benefits of disaster risk management (English)*. Washington, DC: World Bank Group.

[86] Rözer V, Surminski S, Laurien F, McQuistan C, Mechler R. 2023. Multiple resilience dividends at the community level: A comparative study of disaster risk reduction interventions in different countries. *Climate Risk Management* 40: 100518. https://doi.org/10.1016/j.crm.2023.100518

[87] McDonald N, Timar L, McDonald G, Murray C. 2020. Better resilience evaluation: Reflections on investments in seismic resilience for infrastructure. *Bulletin of the New Zealand Society for Earthquake Engineering* 53(4): 203–214. https://doi.org/10.5459/bnzsee.53.4.203-214

[88] Wise R, Marinopoulos J, O'Connell D, Mesic N, Tieman G, Gorddard R, Chan J, Flett D, Lee A, Box P, Meharg S, Helfgott A. 2022. Guidance for applying the Enabling Resilience Investment Framework: Building national capability for Enabling Resilience Investment. Australia: CSIRO. https://doi.org/10.25919/vkh4-mh60

[89] State of Queensland (Queensland Reconstruction Authority). 2021. *Economic Assessment Framework of Flood Risk Mitigation Projects.* Queensland: Queensland Reconstruction Authority.