

GeoNet

10 YEAR STRATEGY 2024 – 2034



Poutama





GeoNet is a web of science, technology and people that collects many of Aotearoa's land and geohazard datasets and contributes to how we understand our whenua. The themes outlined in this strategic plan cannot be understood in isolation and must be viewed as interconnecting parts of a larger picture.

Here, in this image, GeoNet is represented by a Poutama. The Poutama pattern is commonly found in Māori weaving and artwork. It signifies stairs, or the stairway to heaven. The stepped pattern of the Poutama has significant spiritual and educational meaning, symbolising whakapapa and the pursuit of knowledge, rising levels of attainment, advancement and growth and the sharing of that knowledge.

The GeoNet Poutama represents the pathway for change, adaption and growth for GeoNet's infrastructure, data, science, and people. Within this Poutama, we see the many steps, phases, relationships, and processes of GeoNet.

The three pou of this Strategic plan are:

- Sustain,
- Strengthen and Evolve, and
- Transform.

The pou represent phases of GeoNet's path from the past, through the present and into the next ten years. The poutama shows the flow between these stages, but also their asymmetry – the different parts of GeoNet will take different paths, changing and adapting, as they adjust to the known and unknown challenges of our environment.

The tanikore (cross weaving pattern) visible across the three pou are the data and information, perspectives and people that represent GeoNet. They demonstrate the diverse components and the breadth of our people and our partners who are embedded throughout, guiding, strengthening, and aiding GeoNet on its journey of growth to better understand and support Aotearoa New Zealand and its communities.

Contents

06 Foreword

08 What is GeoNet?

10 GeoNet Serves
New Zealand

12 Future States

14

Our Changing
Place in the World

16

Living with
New Zealand's
Natural Hazards

20

Delivering Impact
with our Partners

26

Appendices

Foreword



It is with pleasure that I present GeoNet's 10-Year Strategic Plan. GeoNet has a pivotal role to play within the broader GNS Science strategic framework as we collectively work towards realising GNS Science's vision for a cleaner, safer, and more prosperous New Zealand.

GeoNet integrates into New Zealand's scientific, resilience, and emergency management systems as a cornerstone for developing a comprehensive understanding of our geohazards.

GeoNet employs cutting-edge technology and virtual infrastructure to collect and share crucial data on geohazards, providing scientists and decision makers with invaluable insights. By understanding our geohazards we can better manage risk and improve New Zealand's resilience, economic prosperity and wellbeing. We can design and build infrastructure and communities to better withstand hazard impacts and provide emergency managers, risk managers and communities with tailored advice to help them prepare for, respond to and recover from natural disasters.

GeoNet works in a rapidly evolving operating environment. Its future must adapt to the impacts of climate change, advances in artificial intelligence, national science system reforms, legislative change and rapid new developments in technology and science. It is also challenged by an uncertain funding future, for GeoNet and for the science programmes it is underpinned by.

Globally there is a strong push for multi hazard early warning systems¹ and impact-based forecasting. With its deep expertise in hazard and risk science, GNS (including GeoNet) and our government partners² have a path to navigate to design science services, and the provision of science advice in all its guises, to best enable New Zealanders to live with our natural hazards.

GeoNet's success is deeply connected to collaboration with others. Our collective achievements in understanding New Zealand's land and geohazards in support of decision-making are a result of enduring partnerships among scientists, technologists, communication specialists, emergency responders, central and local government and many other stakeholders. Looking ahead to the ambitious goals outlined in this strategic plan, working closely with the technology and research community, and impact partners, such as infrastructure providers and emergency managers, is essential to improve New Zealand's resilience to natural disasters.

I have confidence that, together, we will make significant strides towards a safer and more resilient New Zealand. As we embark on this ten-year journey, the strength of our team and the tradition of collaboration will be fundamental to realising our collective goals.

I extend my sincere gratitude for your support, and I eagerly anticipate the journey that lies ahead.

Sincerely,



Chelydra Percy
Chief Executive, GNS Science

¹ UN: Early Warning Systems Must Protect Everyone Within Five Years | UNFCCC

² Primarily MBIE, Toka Tū Ake EQC, NEMA and LINZ

What is GeoNet?

The GeoNet Programme (GeoNet) is New Zealand's national land and geohazards monitoring system.

GeoNet was founded in 2001 by visionary scientists, technologists, and leaders from GNS Science Te Pū Ao (GNS), the Earthquake Commission (now Toka Tū Ake EQC) and Toitū Te Whenua Land Information New Zealand. It is the outcome of long-standing partnerships and symbiotic relationships. More recently the National Emergency Management Agency and the Ministry for Business, Innovation and Employment joined the GeoNet endeavour.

Embedded in GNS, GeoNet is an integral part of the virtuous circle between scientific research, advice, data, and infrastructure.

From the sensors in the field to the physical and virtual infrastructure that collect, process, store, and disseminate data to our people who keep these systems fit-for-purpose and running smoothly, GeoNet is designed to help grow our collective understanding of the land we live on. Aotearoa's geohazards – earthquakes, landslides, tsunami, and volcanoes – all affect our social wellbeing and economic prosperity. GeoNet is a public good service and household name, a first 'port of call' for people when the earth moves and, some have said, a tāonga a motu – a national treasure.

Through its core infrastructure, open data, and capability to gather, integrate, and deliver scientific advice, GeoNet is foundational to the provision of high value science advice that supports our decision makers and government. Our technology and research delivery and impact partners build on our outputs to enhance our collective knowledge and understanding, creating high-value intelligence. Together, we enable evidence-based decision-making, and support a host of social, economic, and environmental benefits, including:

- Maintaining a free and open, long-term, consistent record of New Zealand land and geohazard data, used to inform hazard and risk science and science advice
- Growing knowledge and understanding of national and global geohazards, geological processes, and earth science
- Putting New Zealand on the map – GeoNet data underpins New Zealand geodetic and spatial information, which is crucial across all economic sectors
- Through scientific intelligence underpinned by GeoNet data, New Zealanders can make better decisions about where and what to build, improving the resilience of our built environments and infrastructure
- Engaging with people to improve understanding of and readiness for geohazards. GeoNet 'tells it like it is' and often people find that reassuring

- Supporting more effective emergency response and accelerated recovery through the provision of scientific data, information, and advice. GeoNet is always 'on'
- With GeoNet data, New Zealand can approach international capital markets with a strong evidence base, greatly improving our insurability and increasing financial resilience for central and local government, businesses, and households

With our partners, we collectively provide the data and advice New Zealand needs, as referenced in the national Infrastructure Strategy Te Rautaki Hanganga o Aotearoa, our first National Adaptation Plan, and the National Disaster Resilience Strategy Rautaki ā-Motu Manawaroa Aituā.

GeoNet data underpins New Zealand's efforts to become a nation that is more resilient to natural disasters. A strong and prepared nation, where impacts are lessened and recovery is faster. Working with our delivery and impact partners, we help save lives and protect the investments of individuals, communities, corporations, and government.



GeoNet Serves New Zealand

GeoNet is a public service and our open data policy enables the research community to build scientific understanding and inform decision making. GeoNet data is accessed right across the globe, and New Zealand benefits from this.

Looking ahead to the next 10 years we will draw on our deep roots and core infrastructure to continue to serve New Zealand in new, and better, ways. Our work will be guided by the outcomes of the 2022 GeoNet Strategic Review and our continuously evolving principles and practices, including Te Punawai o Rangīātea, the GNS Māori Strategic Plan.

We are planning three sequential future states, Sustain, Evolve & Strengthen, and Transform. They are progressive by design, with blended boundaries between each state. They are set up to support GeoNet to build the capability, resources, and partnerships it needs to achieve the ambitious possible futures it envisions. The future states are indicative and emergent, as we ride the wave of new technology and the changes driven by artificial intelligence.

A 5-year rolling Business Plan will detail the work needed to make the key shifts that will progressively deliver the Strategic Plan. Appendix 1 describes GeoNet's investment and design principles.

The ambition and speed of delivery will always be tempered by:

- the available funding envelope for GeoNet
- the time it takes to build capability (people, process, and technology)
- the constraints of existing technology choices and the dependencies on enabling organisational services
- the available funding for the wider science programmes for our research delivery partners
- the strength of our partnerships and the actions of others



C EARTH
GNS
SCIENCE



GeoNet's Vision

GeoNet is a trusted public good service, highly valued for its widely used open data and readily accessible information and tools that make New Zealand a safer and more resilient place to live.

GeoNet's Strategic Direction

An open, adaptive, automated GeoNet, built on a stable and sustained core system.

Principles that inform the way we work

Kaitiakitanga – Actively caring for our people, policies, data, and systems.

Whanaungatanga – Working together. We aim for seamless, strategic engagement across GNS, research delivery partners, impact partners, collaborators, stakeholders, and users in Aotearoa New Zealand and beyond.

Kunenga mai - Evolution, keeping pace with changes in science, technology, and user expectations to ensure GeoNet's systems, processes, products, and services evolve to continue to meet the needs of future generations.

Future States

01

Now – Sustain

This state involves continuous improvement within GeoNet’s existing scope. It includes ongoing efforts to enhance GeoNet’s resilience, data quality, understanding and planning for upcoming impacts, and partnerships. Failing to achieve this state, or staying in this state, would result in the deterioration and eventual failure of GeoNet’s infrastructure, products, and services with consequential impacts on its partners.

02

Near Future – Strengthen & Evolve

Requires additional resourcing on top of Sustain. In this state, GeoNet increases its resilience and develops new capabilities. The data infrastructure better supports hazard and risk modelling, and stronger partnerships are forged, enabling better utilization of data and scientific services. Failure to transition to this state would impede GeoNet’s ability to embrace new science and technology, like artificial intelligence, ultimately causing infrastructure, products, and services to become obsolete.

03

In 10 years – Transform

Requires additional resourcing on top of both sustain and strengthen and evolve. The most ambitious state envisions further enhancement of GeoNet’s resilience and expansion of its role and scope. Uptake of groundbreaking science and technologies drives the development of new capabilities in terms of people, processes, and technologies. This state opens bold possibilities for GeoNet’s future but can only be reached if the necessary capabilities are first evolved and strengthened.

*Detail on each of the future states can be seen in Appendix 2.



Photo: Conducting pole work at Taiping monitoring station east of Ruapehu

Aotearoa New Zealand sits astride the active boundary of the Pacific and Australian plates, constantly changing our environment and requiring us to adapt. This highly dynamic tectonic landscape means that, to understand where we are in the world, New Zealand must maintain and update its national geodetic reference frame, and its connection to the global geodetic reference frame.

Geodetic reference frames are fundamental to navigation, positioning, and timing systems (e.g. satellite positioning technology such as GPS). They are a key enabler of geospatial activity and critical for geospatial applications from hazard monitoring and disaster risk reduction to land management and surveying, and for any product that requires precise position data. They span all sectors of New Zealand's economy and permeate many corners of our everyday lives.

In 2008, geodetic reference frames were reported to add an estimated \$1.2 billion in productivity-related benefits and other benefits a multiplier more³. This number can only have grown in the 15 years since.

At no point in history have we been so dependent on spatial information and the geodetic data on which it depends.

As we are rapidly evolving we must continuously update our reference points. GeoNet maintains the national Global Navigation Satellite System (GNSS, e.g. GPS) infrastructure and our free and open, real-time data sharing enables New Zealand to stay connected – nationally and globally.

GNSS powers our understanding of the land we live on and is a vital tool in monitoring the geohazards we live with, from land deformation from earthquakes, volcanic unrest, and large landslides to emerging technology that can better assess tsunamis.

Photo: Cracks in SH1, the Hundalee Hills, after the Kaikoura Earthquake

A photograph showing a significant crack in an asphalt road. The crack runs down the center of the road, following a white dashed line. The road is flanked by a metal guardrail on the left and lush green trees and hills on the right. The sky is clear and blue. The overall scene depicts the aftermath of an earthquake in a rural, hilly area.

Our Changing Place in the World

Living with New Zealand's Natural Hazards

New Zealand's position on the tectonically active Pacific 'Ring of Fire' makes the nation vulnerable to damaging and disruptive earthquakes, tsunamis, volcanoes, landslides, and flooding. According to Lloyds, 'New Zealand is ranked second in the world for exposure to losses from natural catastrophes.'⁴ Only Bangladesh has a higher per capita exposure to potential losses.

GeoNet is the backbone of effective geohazard risk management in New Zealand, offering expert advice and data-driven solutions spanning a wide swath of data types (from GNSS and seismic to tsunami and volcano chemistry). Its crucial role in underpinning public safety, land use, and infrastructure preparedness and resilience aligns with commitments to safeguarding our nation's economic prosperity and social wellbeing. GeoNet's legacy of trust and resilience, forged through science, technology, and collaboration, is an invaluable asset that directly benefits New Zealanders.

Over the past 15 years New Zealand has lived through significant geohazard and climate events. Examples include the Canterbury earthquake sequence, the Kaikōura earthquake, the Whakaari-White Island eruption, and Cyclone Gabrielle. These events have been extremely costly both in terms of loss of life and economic and social costs. They have had a material impact on the nation's prosperity and wellbeing. We can expect more of the same in coming years. In fact, we know that the likelihood of events of an equivalent or greater scale occurring is high and increasing.

Some scientific experts suggest there is a 75% chance of an Alpine Fault earthquake of magnitude 8, or greater, occurring in the next 50 years.

The number and severity of climate events is predicted to escalate as climate change further impacts our weather⁵.

New Zealand shares the same preconditions that resulted in the 2011 Tohoku, Japan earthquake and tsunami⁶.

Actual and estimated losses from geohazard events in New Zealand

| Event | Estimated economic cost | Loss of Life |
|--|--|--|
| Canterbury earthquake sequence, 2010/2011, M6.3 | More than NZ \$40 billion ⁷ | 185 lives lost |
| Kaikōura earthquake, 2016, M7.8 | NZ \$2.25 billion insured losses ⁸ | 2 lives lost |
| Whakaari-White Island eruption 2019 | Unquantified but material for Whakatane and surrounding region | 22 lives lost plus many serious and life changing injuries |
| Cyclone Gabrielle | NZ \$15 billion and as of November 2023 | 11 lives lost |
| Future Great East NZ earthquake and tsunami, Hikurangi M9.1 earthquake and tsunami forecast. These are estimates for national CATPLAN22 (NZ Catastrophe Planning). | Based on current resilience: >>NZ \$144 billion (so far excludes infrastructure and indirect losses) | Based on current resilience: 22,180 |

⁴ Lloyd's, 2018, A World At Risk: Closing the Insurance Gap

⁵ Observed changes in extreme weather events are linked to recorded warming and their frequency is projected to increase as climate continue to warm (IPCC AR6; Boedecker et al., 2022).

⁶ Tohoku, Great East Japan earthquake and tsunami, 2011, M9.1 earthquake and tsunami – estimated economic cost of US \$200 billion and estimated 19,747 lives lost

⁷ Canterbury Earthquakes, Insurance Council of NZ Report

⁸ Kaikoura estimated costs, Cost of Natural Disasters – ICNZ, www.icnz.org.nz

Working collaboratively to reduce risk and increase resilience

As a nation our prosperity and wellbeing are dependent on reducing our natural hazard risk and minimising the scale of future disasters⁹. GeoNet and its technology and research delivery partners and impact partners have important roles to play in increasing our resilience to natural hazards and reducing our exposure to losses.

Technology and research delivery partners are technical specialists and scientists who create and steward the GeoNet core systems. They use GeoNet data to grow our fundamental understanding of geohazards and build models and tools that are used to provide hazard insight and advice.

Examples:

- National Seismic Hazard Model
- Shaking Layers
- Rainfall Induced Landslide forecasts

Impact partners are the people, organisations, and agencies that use GeoNet data and science advice to inform their decisions that will benefit the safety, wellbeing and prosperity of the New Zealand public.

Examples:

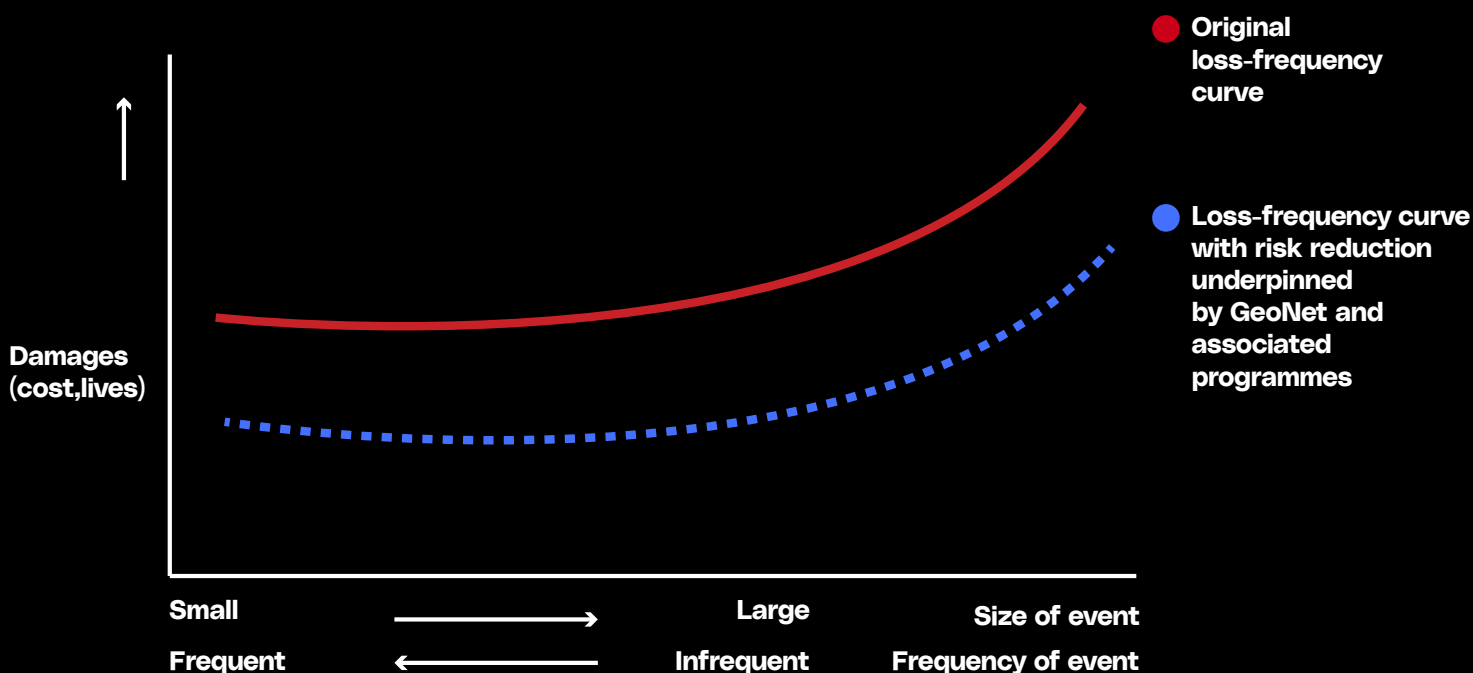
- Toka Tū Ake EQC uses GeoNet data to inform its loss modelling to support conversations with the reinsurance market
- MBIE uses the National Seismic Hazard Model to inform the Building Code
- NEMA uses 24/7 monitoring advice to issue warnings and respond to events

GeoNet has a vital role to play in better understanding our geohazards. Understanding our natural hazards underpins our ability to quantify and manage the risks they pose. Working with our delivery and impact partners, GeoNet helps New Zealand and New Zealanders reduce risk exposure and improve our readiness for, response to, and recovery from natural disasters. Together we can help flatten our cost curve and improve New Zealand's resilience to the impacts of significant natural hazard events. Strong collaborations and partnerships are at the heart of how we must work.

Good understanding enables risk reduction and lowers costs

There is a lot of rhetoric suggesting that disaster risk reduction (DRR) based on an increased understanding of hazards pays, yet there is surprisingly little in the way of hard facts. The limited evidence reported on the economic case for disaster risk management (DRM) is strong and shows the benefits of investing in DRM outweigh the costs of doing so.

Disasters are low-probability, high-impact events. A standard approach for the probabilistic representation of hazard risk is the loss-exceedance curve, which indicates the exceedance probability i.e. the probability of an event not exceeding a certain level of damages. By building and acting on our knowledge of our geohazards, we can reduce the cost of natural disasters. The positive impact of applying an understanding of hazards to risk reduction measures is illustrated below.¹⁰



GeoNet data and expert advice is a foundational cornerstone, the science source that enables critical national decision making. Infrastructure investment and decisions about our built environment that are grounded in a solid understanding of our hazards will reduce risk and better prepare us for natural disasters. GeoNet, together with its technology and research partners and the National Emergency Management Agency (NEMA), Toka Tū Ake EQC, local government, Iwi-Māori, and other agencies with vested interests can

help communities ready themselves for, respond to, and recover from geohazard events.

Our expert assessments and forecasts underpin the fastest and most reliable warnings from our emergency management partners during storms and periods of volcanic unrest, following earthquakes, and in the face of impending tsunamis. During geohazard event responses, GeoNet has become a trusted and reassuring voice for communities. Our 'tell it like it is' approach helps people live with the thought, and the reality, of frightening events.

⁹ To quote the 2019 National Disaster Resilience Strategy – 'As a nation we understand we live in a country exposed to hazards, but we also understand the range of actions to take to limit impacts and ensure the hazards, crises, and emergencies we will inevitably face do not become disasters that threaten our prosperity and wellbeing.' (p25).

¹⁰ Derived from R Mechler (2016) Reviewing estimates of the economic efficiency of disaster risk management: opportunities and limitations of using risk-based cost-benefit analysis

Delivering Impact with our Partners



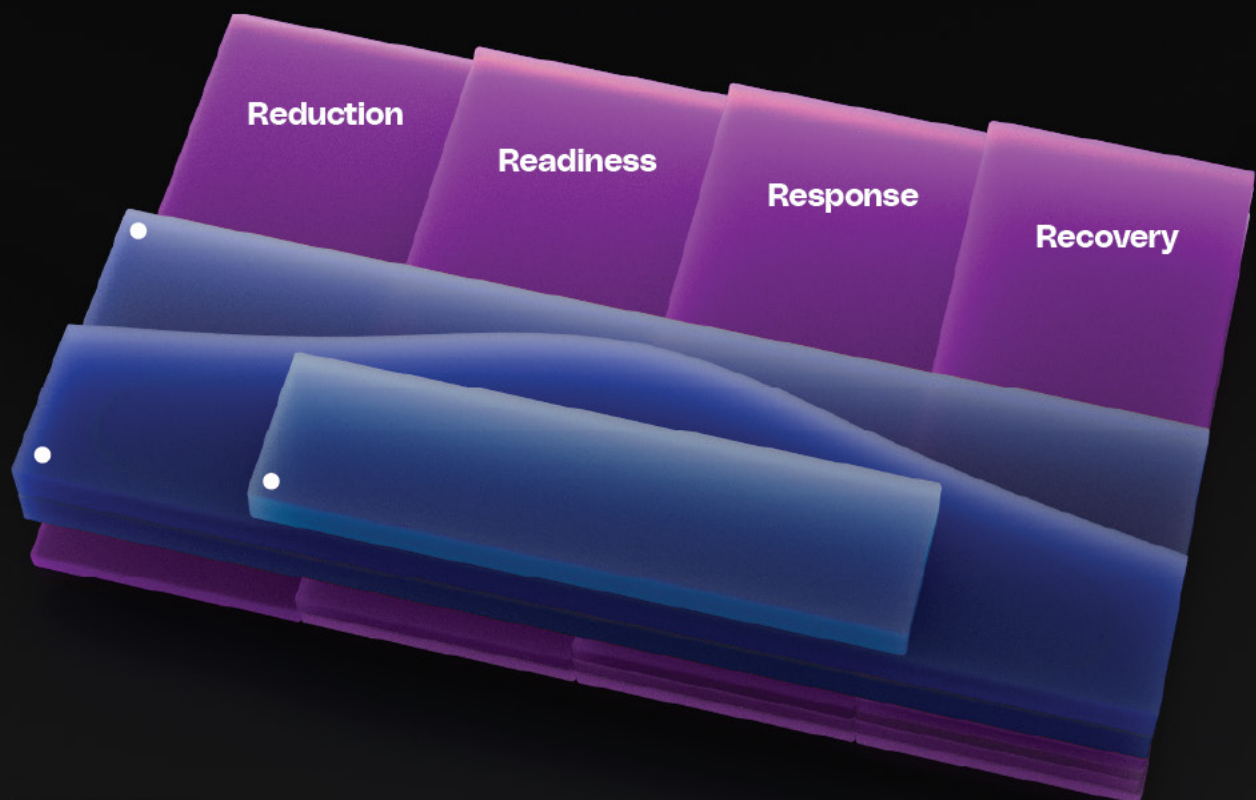
Photo: Field staff servicing recently
commissioned temporary installation

Enabling innovative geohazards science, helping reduce New Zealand's geohazard risks, and flattening the disaster cost curve

GeoNet has a role to play across the 4 Rs (reduction, readiness, response, recovery) but it cannot create impact on its own. Impact is achieved alongside our research delivery and impact partners. Defining and reducing New Zealand's risk profile, flattening the disaster cost curve, and limiting the potential impact of disasters is only achievable through the coordinated efforts of many. As a nation we want to avoid decisions which create maladaptation.

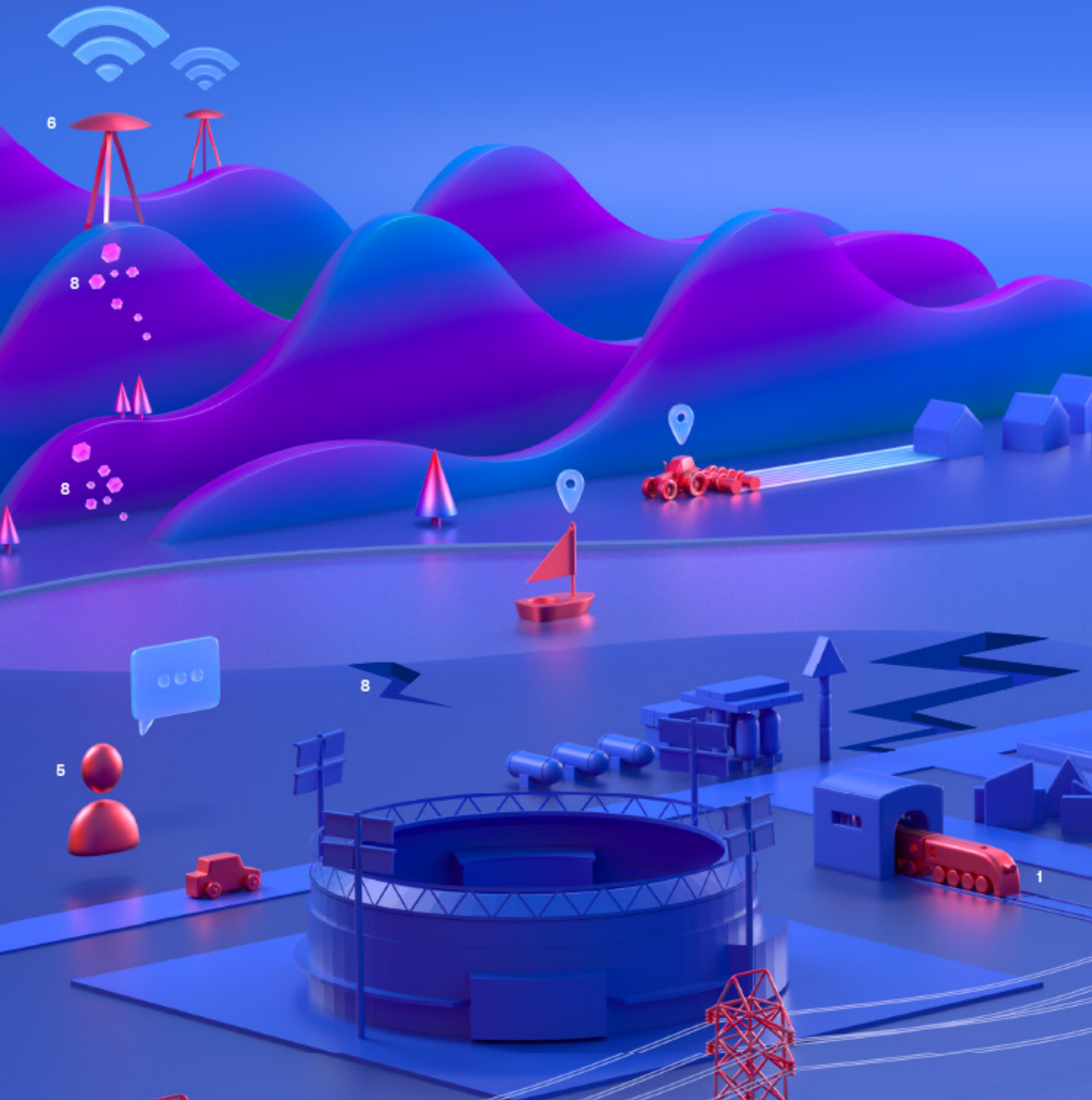
GeoNet data, products and services, and the science it enables our research partners to do (e.g. earthquake, tsunami, landslide, and volcano hazard models) should inform where we build costly and vital infrastructure, the levels of resilience we require for our infrastructure and built environment, and how we approach international capital markets to secure affordable reinsurance.

In partnership, we can ensure decisions are informed by data and expert advice to better mitigate the worst risks and reduce the cost and impact of geohazard events.



- Data infrastructure & data
- Derived data and information products
- More complex analysis/modeling and expert input & interpretation

User Communities



6

8

8

8

5

1

In Partnership

Scientists use GeoNet data to analyse New Zealand's dynamic geohazard processes, building fundamental knowledge of their recurrence, intensity, and effects. This analysis, together with technical expertise, provides the essential basis for the insights and models needed to understand and manage New Zealand's geohazard risks.

Emergency managers rely on GeoNet data and science advice to understand the impacts that different geohazards can have on communities and life safety. Reducing risks and improving our readiness and response to an event reduces the impact of disasters and accelerates our path to recover.

The National Emergency Management Agency uses GeoNet's 24/7 monitoring of earthquakes, landslides, tsunami and volcanoes and expert advice and information to make life safety decisions and issue public warnings and advice ahead of tsunami threats. Ongoing science advice and modelling informs central government decision making through all stages of reduction of impacts, readiness for, response to and recovery from geohazard events.

Local Government makes decisions on land use and manages community infrastructure. They require information on land and hazards – like the potential for liquefaction vulnerability to sea level rise through erosion, uplift, and subsidence, tsunami, landslides, eruptions, flooding – to make decisions which improve the resilience of the communities they serve. This information comes from models derived from GeoNet data.

Infrastructure providers and investors in our built environment need accurate hazard and risk data and modelling to inform the location of infrastructure, housing and other buildings and to inform the design build performance standards to ensure appropriate levels of resilience. Over, or under building, to a level of resilience incurs unnecessary cost or results in avoidable asset failures.

Toku Tū Ake EQC and the insurance industry need to understand how often and with what impact different geohazard events will cause building and infrastructure damage. Loss estimates rely on good information. Open geohazard data from GeoNet verifies the estimates, reducing the uncertainty which can drive a large part of insurance costs. Open access to high quality hazard data and information helps New Zealand remain insurable and inform response and recovery following significant geohazard events.

People living in and visiting New Zealand need to understand the natural hazard risks they are subject to. GeoNet's trusted voice helps. We want people to make decisions which support reducing risk, like removing old brick chimneys and investing in real estate outside of tsunami evacuation zones. We want people to be prepared for natural hazard events, and to know what to do during and after they happen.

Surveyors and users of geospatial technology (all of us!) rely on geolocation services, underpinned by the GeoNet network. The New Zealand Geodetic Datum, national deformation model, and New Zealand's relationship with the International Terrestrial Reference Frame, all depend on geodetic data produced by GeoNet. This data is crucial to making location-based applications possible – mapping, surveying, gauging land subsidence and sea-level rise, transport, and navigation – all of which have important implications for New Zealand's economic prosperity as well as for geohazard event response and recovery.

Iwi, Māori need to understand the impacts that different natural hazards can have on their communities and rohe. Preparing communities for risk reduction, readiness, response and recovery from geohazard events requires a trusted source of information. We want to work with Iwi, Māori as monitoring partners to better understand their information needs while respectively learning from each other and sharing knowledge to inform decision making. We partner with Iwi, Māori to access land where monitoring equipment can be located, this partnering facilitates a shared understanding of needs.

Appendix 1

Guiding our decision-making

GeoNet's decision making will be guided by principles for design, investment, and the Head Operating Agreement to ensure opportunities and growth are deliberate and well-managed. GNS works with its partners to guide its investment decisions and ensure investment is targeted to deliver maximum value and impact for Aotearoa-New Zealand.

Investment Principles

Investments shall always contribute tangibly to consistency of acceptable performance, and enhancements must not compromise the core system.

Lifecycle costs of maintaining and upgrading the core services need to be accounted for in development of new products and services.

New products and services should cost-effectively increase adaptability of the system for the long term to minimise accumulation of technical debt. i.e. Development of new products and services considers the fully product and service life cycle. Collective approach and transparency in priority-setting across the range of purposes.

New products and services should seek to achieve balanced outcomes for science knowledge, risk assessment, emergency management response, and geographic information (Lifelines, preparedness, emergency management – across the 4 Rs).

Strategy for change and enhancements should be informed by all sciences (physical and social, data), new technologies, and regulatory needs.

GeoNet investments should seek to leverage other investments to maximise the national geohazard monitoring and data capabilities, and provision of science advice.

Core Design Principles

Public good - GeoNet data is open, accessible, of known quality, adheres to privacy and other applicable laws and best practices, does no harm, and contributes to New Zealand's efforts to address complex challenges of our time, such as geohazards, climate change and beyond.

Intentional and communicated - Our choices are deliberate, informed, considered, and shared appropriately.

Resilient core - Our services and products withstand difficult situations, geohazard events, and are supported with funding and capability.

Science and technology driven - Science and technology decision-making and expertise is at the heart of the services and products, science outputs (including outputs for science) are fit for purpose/ useful, usable, and used.

Balanced - Balanced between risks and opportunities, the national interest, IT needs, and our partners, users, and stakeholders.

Appendix 2

NOW - Sustain

Continuous improvement within GeoNet's existing scope.
Resourced as in FY23-24.

Core

- Sensor network maintained with current levels of resilience & coverage.
- 24/7 Information Systems & Technology support as funding allows.
- DART network is integrated within GeoNet.
- Expanded use of AWS in place of on-premises infrastructure and equipment.
- Modernise the architecture of earthquake location system.
- Continue current automation and data science pathways.
- Consistent use of automation between GeoNet and where appropriate the wider GNS.
- GeoNet infrastructure allows to securely ingest 3rd party data from selected partners
- Technologies taken up by GeoNet are maintained and reviewed, and obsolete technologies are deprecated and replaced with new ones.

Products & Services

- 24/7 monitoring – investment in infrastructure, people, technology/tools, and science matches contractual expectations.
- GeoNet clarifies its relationship with 3rd party datasets, in line with its Data Strategy and related policies. This includes ingesting specific/high priority 3rd party data for hazard monitoring, when such datasets align with GeoNet standard practices.
- Communities support the collection of data through existing crowd source data products i.e. Felt reports.
- Significant investment in data quality.

Engagement, Outreach, & Partnering

- Clear pathways for GeoNet are informed by science, technical, and user advice from our hunga whaipānga. Includes the establishment of a Technical Advisory Panel.
- Brand clarity supports GeoNet to continue its outreach work, amplifies the work of others, and incrementally grows GeoNet's audience.
- Multiple partnerships with science programmes are valued and strengthened. E.g. social science and communications.

Funding, Contracting & Governance

- Funding certainty for current scope.
- Funding certainty for underpinning science programmes, technology, and supporting functions.
- Evolution of governance to match funding paths.

Appendix 2 (cont.)

NEAR FUTURE – Strengthen & Evolve

Increasing GeoNet’s resilience level and developing new capabilities. Additional resourcing is required.

Core

- Sensor network strengthened to enhanced levels of resilience in the face of geohazard and climate events.
- Sensor network coverage is expanded such that coverage meets user requirements, e.g. global positioning, hazard and risk modelling.
- Increased levels of resilience across IT platforms and infrastructure.
- New technology is taken up by GeoNet e.g. offshore seismic and geodetic monitoring, real-time GNSS streaming.
- Investment in data infrastructure is compatible with changing technology and evolution of data usage and requirements. This will include looking at appropriate 3rd party and crowd sourced data.
- Data requirements for national hazard and risk modelling met.
- Accelerated process of automation and uptake of data science tools.

Products & Services

- 24/7 monitoring, advice is faster and more accurate through investment in infrastructure, and optimisation of the investment in people, technology/tools, and science.
- GeoNet, in collaboration with GNS Te Tiriti partners, classify its datasets and assess those of interest for Māori.
- Increased use of crowd sourced data.
- GeoNet clarifies its role in the national geohazard data system. This may include acting as a data centre for some types of 3rd party data, while others may have more natural homes (e.g. Earthscope for seismic data).
- GeoNet data can be ingested into national planning and strategy documents.

Engagement, Outreach, & Partnering

- Strong partnerships across sectors enhance our products and services – e.g. Iwi-Māori communities, civil defence sector, building and engineering communities, etc.
- GeoNet reaches more diverse communities through active engagement.
- Brand clarity ensures GeoNet maximises its impact.

Funding, Contracting & Governance

- Funding envelope to support expanded scope and enhanced levels of resilience.
- Funding certainty for underpinning science programmes including natural hazard and risk models for earthquakes, landslides, tsunami and volcanoes.

Appendix 2 (cont.)

IN 10 YEARS – Transform

Further increasing GeoNet’s resilience, additional new capabilities, and expanding GeoNet’s role. Including the resourcing for both previous states and additional resourcing. Resources dependent on other functions and services outside of GeoNet, which would also need to be resourced.

Core

- Sensor network is transformed by new technologies and emerging data sources e.g. Internet of Things (IOT), under-sea cables or digital acoustic sensors.
- Monitoring scope expands to other perils and/or data sources to bring efficiencies to the nation.
- GeoNet infrastructure and systems are resilient, scalable and capable of growth.
- Application of generative AI techniques.
- GeoNet infrastructure enables consistent and continuous data quality assessment and control across all datasets.
- GeoNet infrastructure enables interoperability and discoverability of New Zealand geohazard data for any users.
- Deep partnerships with research programmes deliver operational tools with appropriate infrastructure and lifecycle planning.

Products & Services

- 24/7 monitoring – Infrastructure, systems, and process integration across monitoring/forecasting agencies (e.g. NEMA and MetService).
- GeoNet plays a role in delivering Multi-Hazard Warnings and Impact Forecasting in NZ.
- GeoNet plays a role in supporting Multi-Hazard Warning Systems and Impact Forecasting in the SW Pacific.
- GeoNet’s data practices match Māori data governance practices.
- GeoNet data can be easily ingested into the digital twin models for cities and infrastructure.
- All data products have quality assessment and control parameters so that data is of ‘known quality’.
- Data acquisition (e.g. sensor networks), transportation (e.g. communications network) and other infrastructure deliver higher rate data faster to support emerging tools.
- Products and services include the right data at the right times for key use cases.
- GeoNet is the geohazard data centre for New Zealand.

Engagement, Outreach, & Partnering

- Iwi are monitoring partners and we work together to provide and share information on our dynamic environment.
- GeoNet product and service development is driven by sustained and mature partnerships with our hunga whaipānga.

Funding, Contracting & Governance

- Cross agency agreement to define the role of GeoNet in Multi-Hazard Warnings and Impact Forecasting in NZ and the Southwest Pacific.
- Funding envelope to support expanded role.
- Ongoing funding for underpinning and emerging science including natural hazards and risk models for earthquakes, landslides, tsunami, and volcanoes.



Toka
Tū Ake **EQC**



Toitū Te Whenua
Land Information
New Zealand



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI



National Emergency
Management Agency
Te Rākau Whakamarumaru

geonet.org.nz