



BRIEFING

Sustainable arrangements for GeoNet and the National Seismic Hazard Model

Date:	14 December 2023	Priority:	Medium
Security classification:	In Confidence	Tracking number:	2324-1028

Action sought		
	Action sought	Deadline
Hon Mark Mitchell Minister for Emergency Management and Recovery	<p>Agree MBIE officials will provide further advice on how to address funding shortfalls once budget strategy is agreed.</p> <p>Agree to seek further advice on sustainable oversight arrangements.</p> <p>Forward a copy of this briefing to interested Ministers.</p>	19 December 2023
Hon Judith Collins Minister of Science, Innovation and Technology	<p>Note the shortfall for GeoNet and the National Seismic Hazard Model and the potential implications for geohazards research and management and for GNS Science if this is not addressed</p>	19 December 2023

Contact for telephone discussion (if required)			
Name	Position	Telephone	1st contact
Richard Walley	Policy Director, Science, Innovation and International	Privacy of natural persons	✓
Privacy of natural persons	Policy Advisor, Science Policy		

The following departments/agencies have been consulted
National Emergency Management Agency, Toka Tū Ake EQC (Toka Tū Ake), Land Information New Zealand (LINZ), Department of the Prime Minister and Cabinet, Ministry of Foreign Affairs and Trade (MFAT), The Treasury and MBIE Building Performance

Minister's office to complete:

- | | |
|-----------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> Approved | <input type="checkbox"/> Declined |
| <input type="checkbox"/> Noted | <input type="checkbox"/> Needs change |
| <input type="checkbox"/> Seen | <input type="checkbox"/> Overtaken by Events |
| <input type="checkbox"/> See Minister's Notes | <input type="checkbox"/> Withdrawn |

Comments



BRIEFING

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Purpose

To advise on the current state of New Zealand's geohazard monitoring and modelling platforms, including a significant funding gap from 1 July 2024, and to outline what we need to do next.

Executive summary

GeoNet and the National Seismic Hazard Model (NSHM) provide critical information that supports management of New Zealand's geohazard risk, and land information systems. Information from these platforms is used across a number of portfolio areas.

The Minister for Emergency Management and Recovery is responsible for interim top up funding for these platforms via an appropriation managed by the Ministry of Business, Innovation and Employment (MBIE).

Without new funding, these platforms cannot operate beyond 30 June 2024, with consequent reduction in the data and information available to manage geohazard risks.

An immediate decision is needed on addressing the funding gap. MBIE is working with GNS Science and other agencies to prepare funding options ahead of the Budget 2024 process. The funding gap is in the order of [Confidential advice to Government] operating funding over four years, plus capital funding of around [Confidential advice to Government] per annum.

A long-term funding solution is the best option to maintain these platforms, as it allows government to manage the ongoing costs for these platforms in totality.

In addition to providing sustainable funding, government also needs to consider how to manage and oversee the total investment in these platforms in the future. [Confidential advice to Government]

Recommended action

The Ministry of Business, Innovation and Employment recommends that you:

The Minister for Emergency Management and Recovery:

Geohazards funding and sustainable arrangements

- a **Agree** MBIE, as Vote Manager, will provide you with further advice on the approach to Budget 2024 once the Government's budget strategy is agreed.

Agree / Disagree

b **Agree** MBIE officials will work with other agencies to develop further advice **Confidential**
Confidential advice to Government

Agree / Disagree

c **Forward** a copy of this briefing to the Minister of Finance and the Ministers for Land Information, Building and Construction, and Infrastructure and the Minister of Transport, so that they are aware of the need to address the funding gap for GeoNet and the NSHM.

Yes/No

Non-Departmental Appropriations – Emergency Management

d **Note** that under the Public Finance Act you are required to present the Non-Departmental Appropriations Report – Emergency Management portfolio to the House of Representatives as soon as possible after the commencement of the next session of Parliament.

Noted

e **Note** that tabling and publication on the Parliament website is an administrative process that your Office will facilitate, and the previous Ministers' signatures on the reports is appropriate given they relate to the 2022/23 year and will have been signed prior to the General Election.

Noted

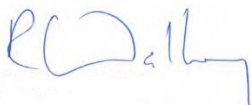
f **Note** that we will liaise with your Office for sending the reports to the office of the clerk, so they can be tabled in the House as soon as practical.

Noted

The Minister of Science, Innovation and Technology:

g **Note** the funding gap for GeoNet and the National Seismic Hazard Model from 1 July 2024, with negative implications for geohazards research and management and GNS Science viability if this is not addressed.

Noted



Richard Walley
Policy Director, Science, Innovation and international

14 / 12 / 2023

Hon Mark Mitchell
Minister for Emergency Management and Recovery

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Hon Judith Collins
Minister of Science, Innovation and Technology

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Background

1. The Minister for Emergency Management and Recovery is responsible for the interim funding for GeoNet and the National Seismic Hazard Model (NSHM), two geohazards information platforms hosted by GNS Science (GNS) (\$31.8 million in 2023/24, on top of \$11 million from other sources).
2. GeoNet is New Zealand's core system for monitoring volcanoes, earthquakes, tsunami and landslide risks. It also provides location data for global positioning. Many New Zealanders use the GeoNet app on their phone.
3. The NSHM uses data from GeoNet and elsewhere to estimate earthquake ground shaking around the country. NSHM data is used by engineers, builders, insurers and asset managers when considering how to make buildings and infrastructure more resilient to earthquakes.
4. These platforms do not have enduring funding. In 2021, Cabinet directed officials to investigate and prepare a long-term sustainable funding solution for GeoNet and the NSHM and invited the Minister for Emergency Management to update Cabinet on future ministerial and agency responsibility arrangements (*GOV-21-MIN-0066 refers*).
5. In June 2022, and prior to Budget 2023, the previous Ministers of Emergency Management and Research, Science and Innovation agreed that the National Emergency Management Agency (NEMA) would be the responsible agency for GeoNet in the long-term. Ministers also agreed that in the short term, MBIE would lead with NEMA assistance to develop a sustainable funding model and prepare a budget bid. Only one year's funding was provided through Budget 2023.
6. This briefing provides an outline of the Minister for Emergency Management and Recovery's role relating to these platforms and the key risks and issues.
7. MBIE is providing this briefing, as we are the administering agency for the interim funding, as agreed by the previous Government in 2021 (*GOV-21-MIN-0066 refers*).
8. Key agencies provided feedback on this advice, including NEMA, Land Information New Zealand (LINZ) and Toka Tū Ake.

New Zealand's Geohazards Monitoring and Modelling Platforms: why we need them and what they are

Data, information and modelling helps New Zealand manage its geohazard risks

9. New Zealand is highly vulnerable to natural hazards and ranked as having the second highest exposure to losses from natural catastrophes per capita in the world¹. The productivity and wellbeing of businesses, communities, government, iwi and hapū rely on our ability to manage these natural hazard risks. Data, information and modelling increase our understanding about risk, lowering uncertainties and allowing us to better plan and manage risk, to increase our resilience and reduce the costs of hazard events.

GeoNet is New Zealand's core system for monitoring earthquake, volcano, tsunami and landslide threats.

10. GeoNet is made up of over 9,000 sensors at 700 sites, a data infrastructure, and a set of products and services that rely on the data collected across the network. Data is made publicly available, with 290,000 users of the GeoNet app in August 2023. Data is also used in geohazards research and is the basis for products and services, such as advice to inform

¹ [A world at risk: Closing the Insurance Gap. Lloyd's underinsurance report 2018](#)

emergency warnings for tsunami and volcanic eruptions, volcanic ash information for aviation, and global location information.

The National Seismic Hazard Model estimates the likelihood and strength of earthquake ground shaking around the country

11. The NSHM provides the basis for New Zealand's understanding of the seismic risk we expect – and should plan for. It is based on 'cutting-edge' science and at the forefront of developments worldwide. The model allows technical users to forecast earthquake shaking at any given site. It informs building policy and building performance regulations and is used by insurance companies to inform risk pricing, including by the international financial markets that we rely on for reinsurance coverage.
12. The NSHM was updated in 2022, the first fundamental update since the 1990s. The update saw a large increase in modelled seismic hazard risk. A smoother, more frequent and regular update cycle would make it easier for the infrastructure sector to respond to changes.

GNS is the host for GeoNet and the NSHM

13. GNS, also known as the Institute of Geological and Nuclear Sciences, is a Crown Research Institute, a Crown-owned company that undertakes scientific research for the benefit of New Zealand. It specialises in geology, energy and minerals research. Many government agencies and private companies purchase research, science services and expert advice from GNS.
14. Agencies have funded GNS to develop GeoNet and the NSHM over a number of years. Toka Tū Ake and LINZ provided initial funding for GeoNet from 2001, with support from MBIE for the 24/7 Monitoring Centre since 2018. Toka Tū Ake and the Building levy have supported the development of the NSHM. Agencies provide direction via purchasing decisions and Advisory Panels.

Funding for GeoNet and the National Seismic Hazard Model

15. The Minister for Emergency Management and Recovery is responsible for the *Services for Geohazards Management* multi-category appropriation via Vote Business Science and Innovation (BSI). This provides capital and operating funding to GNS to maintain GeoNet and the NSHM until 30 June 2024. It is a non-departmental appropriation within Vote BSI, Emergency Management: Services for Geohazards Management (M11) (A17).
16. In Budget 2023, one year's funding of \$31.8 million was provided through this appropriation, as shown in the table below.

Funding source (\$ millions)	GeoNet	NSHM
Vote BSI appropriation (total \$31.8 million 2023/24 only)		
MBIE on behalf of the Minister for Emergency Management and Recovery	18.7 capital 6.7	6.4
Other funding (ongoing)		
MBIE (Strategic Science Investment Fund)	6	
Toka Tū Ake	4	
LINZ	1	
Other (Department of Conservation and MetService)	0.064	
TOTAL operating	29.764	6.4
TOTAL capital	6.7	

Without new funding, GeoNet and the NSHM will not be able to continue from 1 July 2024

17. Existing funding for GeoNet would cover only very limited services. Without funding, the following would be compromised or stopped (not exhaustive):
 - a. identifying the location of New Zealand's earthquakes when they occur
 - b. timeliness and quality of expert advice in national events and emergencies involving earthquakes, tsunamis, volcanoes and landslides
 - c. the data services to LINZ, supporting geolocation services and New Zealand's contribution to the global geodetic reference frame
 - d. forecasts supporting Emergency Managers to give tsunami and volcano warnings
 - e. the GeoNet website and app
 - f. New Zealand's ability to retain specialist hazard modelling capabilities and international monitoring initiatives
 - g. ongoing geohazard research programmes.
18. There will be no funding available for the NSHM. Without funding, the following would be compromised or stopped (not exhaustive):
 - a. reduced understanding of seismic risks affecting access to the reinsurance markets
 - b. how we manage our infrastructure to reduce damage in geohazard events.
19. There would also be significant impacts for GNS Science, as GeoNet and the NSHM provide about 20 per cent of GNS funding. GNS would need to consider downsizing the organisation and would face decommissioning and redundancy costs.
20. Sustainable long-term funding is needed to support New Zealand's ongoing ability to respond to geohazard events, retain specialist capability, and deliver science and resilience outputs. Current and previous funding arrangements have created repeated short-term funding gaps, and lack of certainty about future funding and government priorities for the services, making it difficult to plan and manage these programmes over the long-term.

Confidential advice to Government

21. Confidential advice to Government

22. Multiple agencies have interests in GeoNet and the NSHM outputs², with benefits summarised in **Annex One**. However, no single agency is the primary beneficiary.

Confidential advice

Confidential advice to Government

23. Confidential advice to Government

24. Confidential advice to Government

² Agencies include NEMA, Toka Tū Ake, MBIE building systems performance, and LINZ.

Confidential advice to Government

25. Confidential advice to Government

Actions to create sustainable arrangements

We recommend seeking long-term funding in Budget 2024

26. The Government's budget strategy will inform the approach to seeking funding in budget 2024. Given there are likely to be tight timeframes, MBIE is working with GNS and other agencies to prepare for the budget process.
27. Pending final budget strategy, our advice is that the Minister for Emergency Management and Recovery seek long-term baselined funding via Budget 2024, to avoid cost pressure bids in coming years. Longer-term funding will allow Ministers to consider the known cost pressures for these platforms in totality, make appropriate trade-offs, and effectively manage the ongoing funding requirements. It would also provide a basis for Ministers and agencies to agree future roles and responsibilities.
28. Treasury has advised us that that there may be limited funding for existing initiatives via Budget 2024. Confidential advice to Government
However, given the size of the shortfall, new funding is likely to be required.

We are developing preferred and scaled funding options

29. MBIE is working with GNS to develop funding options that maintain core assets and enable science advice processes to respond to user needs. Preferred and scaled options are listed below.

Preferred option - long-term sustainability

- GeoNet Confidential advice to Government

- NSHM Confidential advice to Government

Scaled option – maintains GeoNet and the NSHM at current levels

- GeoNet Confidential advice to Government

Confidential advice to Government

- NSHM Confidential advice to Government

30.

Confidential advice to Government

We also recommend the Minister for Emergency Management seeks further advice on establishing sustainable arrangements for collective oversight of GeoNet and NSHM investments

31. Agencies have already provided input on broad brush options for new arrangements. Implementing new arrangements will require further policy work to develop the details of potential new mechanisms, as well as testing options with other interested Ministers, followed by Cabinet decisions to implement the preferred option. This will include considering which Minister and agency will take ongoing responsibility for working with across portfolios and managing long-term investment.

Reporting processes for the appropriation

Non-Departmental Appropriations Report (NDAR) – Emergency Management

32. The 2022/23 NDAR contains end of year performance information relating to the non-Departmental appropriation within Vote BSI, Emergency Management: Services for Geohazards Management (M11) (A17), you are responsible for (see **Annex Two**).
33. Under the Public Finance Act 1989, responsible Ministers for non-Departmental appropriations with reportable performance information are required to present any end-of-year performance reports to the House of Representatives within four months after the end of the financial year or, if Parliament is not in session, to ensure that the information is presented as soon as possible after the commencement of the next session of Parliament.
34. As Parliament had been dissolved in anticipation of the General Election on 14 October 2023, the report has been approved by previous Minister and published on MBIE website to fulfil subsection 19B (4) of the Public Finance Act 1989 and you are now required to table it on the first available sitting day.

NEMA comment

35. Confidential advice to Government

Next steps

36. With the agreement of the Minister for Emergency Management and Recovery, MBIE will continue to work with GNS, the Treasury and other agencies to prepare for the Budget

process to address the immediate funding gap. We can update you once the Government's strategy for Budget 2024 is determined, noting that this may affect the approach to seeking funding.

37. With your agreement, MBIE will continue to work with other agencies on options for a collective arrangement for managing investment in GeoNet and the NSHM and will provide further advice, that covers options and implementation. We aim to provide this advice early in 2024 so that arrangements can be determined before Budget 2024 decisions in April/May. This includes decisions on lead Minister and agency responsibilities.
38. To ensure that interested Ministers are aware of the immediate funding need for Budget 2024, we recommend you share this briefing with interested Ministers, including the Minister of Finance and Transport, and Ministers for Land Information, Building and Construction.

Annexes

Annex One: Benefits provided to users of geohazard services and associated risks if funding was stopped

Not in scope

Annex One: Benefits provided to users of geohazard services, and associated risks if funding was stopped

The table below documents the benefits that GeoNet and the NSHM provide across multiple portfolios in the system, as well as giving high level overview of the risks to the different stakeholders if funding for GeoNet and the NSHM were removed.

Sector Stakeholders	Benefits GeoNet and the NSHM provide to end-users and risks if funding were removed
General Public	<p>Benefits: New Zealanders have access to information about natural hazard events, providing greater peace of mind and informed decision making. Having access to hazard data may increase public awareness and lead to mitigation measures in the home, eg securing heavy items.</p> <p>For example – when an earthquake occurs, New Zealanders can access information about the location and scale from GeoNet.</p> <p>Risks if services are not available: lowered community confidence and awareness of geohazard risk.</p>
Emergency Management	<p>Benefits: expert advice provided informs warnings and evacuations in tsunami and volcanic events, to identify affected areas and enhance understanding of impact and ongoing risks.</p> <p>For example – NEMA is able to provide evacuation warnings for affected areas in the case of a tsunami event.</p> <p>Risks if services are not available: decreased detection of natural hazard events and associated hazards which would lead to increased risk to public safety/loss of life and inhibits response recovery.</p>
Land information	<p>Benefits: the PositionNZ network provided by GeoNet through LINZ investment supports surveyors, the construction sector and asset managers to identify locations with an accuracy that approaches a few centimetres.</p> <p>For example – PositionNZ supports the construction of key infrastructure such as roads and sewers by providing accurate positioning data that is used by surveyors, engineers and in automated machine control software to ensure such infrastructure is located in accordance with design specifications.</p> <p>Risks if services are not available: Obtaining centimetre-accurate positions required by many applications (such as engineering, asset management, and property surveying) is less efficient, less accurate and requires manual adjustments, due to the inability to reliably track tectonic plate movement. Response and recovery of key infrastructure (eg roading, sewer networks) after a natural disaster (eg earthquake) is delayed. Sharing, integration and long-term management of existing spatial data is less efficient, due to inability to accurately track changes in position over time due to land movement.</p>

Sector Stakeholders	Benefits GeoNet and the NSHM provide to end-users and risks if funding were removed
Land Use Planning and Resource Management	<p>Benefits: data about geohazard risk can inform local government resource management and critical infrastructure planning and management.</p> <p>For example - local authorities can use outputs to inform planning rules and regulations and the Ministry for the Environment can inform legislation on land use to encourage development and densification in regions with lower risk from natural hazards.</p> <p>Risks if services are not available: there is an increased potential that serious hazards could be overlooked in in land use planning and resource management such as changes in magma location, or where we build dams or develop new housing.</p>
Building and Infrastructure	<p>Benefits: data from GeoNet enables infrastructure managers to understand and plan for geohazard risks. The NSHM is critical input to keep the Building Code up to date and ensure life safety risk in earthquakes is effectively managed.</p> <p>For example - Transpower engineers use NSHM information to manage electricity infrastructure to reduce potential damages from geohazards events.</p> <p>Risks if services are not available: Reduced ability to plan for risks, and to minimise loss of life due to poor performance of infrastructure following an earthquake. Reduced knowledge on seismic risk will affect New Zealand Building Code and there is a greater chance of more widespread damage and loss of life in future events.</p>
Insurance	<p>Benefits: NSHM data underpins understanding of seismic risks in New Zealand.</p> <p>For example – information about the nature of New Zealand’s hazards gives reinsurers confidence to continue to invest in New Zealand, so that New Zealand can continue to access reinsurance markets. In 2022 Toka Tū Ake secured \$7.4b of cover, the cost of purchasing this cover was \$286 million.</p> <p>Risks if services are not available: if we do not improve our understanding of geohazard risk and insurers and reinsurers lose confidence in their/our understanding of New Zealand’s hazard risk, and either exit the New Zealand market, or price the uncertainty, leading to very high insurance/reinsurance premiums.</p>
Transport	<p>Benefits: data is used to ensure safe navigation. The NSHM is also key input to design of transportation infrastructure critical to recovery after large earthquakes.</p> <p>For example – the Volcanic Ash Advisories enable the aviation industry to safely plan routes by taking into account the presence and movements of volcanic ash clouds.</p> <p>Risks if services are not available: higher risks for ship and aircraft navigation with risks for business continuity and life safety.</p>

Sector Stakeholders	Benefits GeoNet and the NSHM provide to end-users and risks if funding were removed
International Engagement	<p>Benefits: system infrastructure allows New Zealand to participate in international initiatives.</p> <p>For example – the Pacific Tsunami Warning Centre which ensures New Zealand and Pacific countries have access to information about tsunami risk in the region. GeoNet provides information to the Australian Bureau of Meteorology; the Intergovernmental Oceanographic Commission; and the Joint Australian Tsunami Warning Centre. Specific GeoNet sites are used to detect and monitor global nuclear activity under the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).</p> <p>Risks if services are not available: GNS can no longer deliver on international obligations/initiatives such as Volcanic Ash Advisory for domestic and international aviation. New Zealand is no longer able to participate in international initiatives.</p>
Financial Resilience	<p>Benefits: having adequate hazard risk management information, practices, planning etc is needed to support New Zealand’s financial resilience.</p> <p>For example – the Reserve Bank of New Zealand uses outputs to inform solvency standards for insurance and banks. As per above information on risk can inform international modelling companies’ risk and loss models for insurance and finance, thereby providing confidence to financial markets to invest in the country.</p> <p>Risks if services are not available: reduced confidence in investing in New Zealand.</p>
Science and Innovation	<p>Benefits: supports both short-term research during an event response and long-term research relating to hazards and impacts and our understanding of how New Zealand’s landscape has evolved.</p> <p>For example – the science that came out of Kaikōura earthquake greatly informed our understanding of multiple fault ruptures during and after the earthquake and improved our estimates of seismic hazard in NSHM.</p> <p>Risks if services are not available: reduced scientific reputation, inability to keep up with scientific advances that have the potential to inform better risk management in New Zealand.</p>

Not in scope