

GNS SCIENCE  
TE PŪ AO

# OUR STATEMENT OF CORPORATE INTENT

JULY 2024



**MAI I TE RANGI, KI TE NUKU O  
TE WHENUA, KA PUTA TE IRA  
TANGATA I TE PO, I TE WHAIAO,  
TE AO MARAMA.**

**NAU MAI, HAERE MAI  
KI TE PŪ AO**

**FROM THE SKY AND  
THE LAND CAME PEOPLE,  
FROM THE NIGHT,  
TO THE OLD WORLD,  
TO THE WORLD OF LIGHT.**

**WELCOME TO GNS SCIENCE**

*GNS Geologists and virtual tour guides at Jam Roll Bay in north Taranaki, one of the sites that featured in our first virtual field trip.*

**Cover**

*Volcanic Fluids Geochemist/Lead Scientist conducting fumarole sampling on Moutohorā Island*

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# INTRODUCTION FROM THE CHAIR AND CEO – HE KUPU WHAKATAKI MAI I TE TIAMANA ME TE TUMUAKI



*Left: David Smol, Chair, Right: Chelydra Percy, Chief Executive*

**Aotearoa New Zealand is navigating the aftermath of global and local crises. A pandemic, the intensifying effects of climate change, and ever-present natural hazards have disrupted and changed the lives of New Zealanders.**

A global energy crisis has provided a stark reminder of the need for more resilient ways to power our lives. These challenges have contributed to an economic environment marked by increased inflation, cost of living pressures, and slow growth in productivity. But they have also reinforced the vital role of science and innovation in boosting economic performance and safeguarding lives.

Increased science collaboration between the public and private sectors unlocks innovation, drives productivity, and creates new technologies that can position Aotearoa New Zealand as a leader in global change and development. Using science, better decisions are made about how to protect our economy from the shock of destructive natural hazard events and the intensifying effects of a changing climate.

GNS Science sits at the interface of this public and private collaboration. Our science, alongside our partners, identifies how Aotearoa New Zealand's rich resources can be harnessed, stored, and used to power our nation sustainably and economically into an emission-free future. It enables the country to build resilient property and infrastructure in the face of earthquakes, volcanic activity, landslides, and tsunamis. It keeps homes and communities safe.

The GNS Science Statement of Corporate Intent for 2024-2027 outlines our contribution over the next three years. Focused on 2024/25 it describes GNS Science's direction, key initiatives, and performance measures, and outlines how we will manage and mitigate risks, and maximise opportunities. It also forecasts our activity out to 2026/27.

## SCIENCE DIRECTION

Our Science Roadmap aligns our science direction with national priorities and the needs of our stakeholders, industry partners, iwi, and communities. The Roadmap sets out the critical contribution GNS Science will make to Aotearoa New Zealand's long-term energy needs, sustainable use of our natural resources, climate goals, and infrastructure development to support economic growth.

GNS Science is actively responding to opportunities and challenges outlined in our Science Roadmap, as well as in our operating environment. We are developing a new organisational strategy to enable the business decisions and financial performance that will deliver our vision. This strategy will anchor our efforts, investments, planning, and reporting. It will guide us in maintaining and developing the critical scientific capability, services, and support that drive evidence-based decision-making and economic growth. It will power us to become a more high-performing organisation, both financially and operationally.

We support the Government's ambition to grow economic productivity through science and innovation. Contributing to the Science System Advisory Group's work is a welcome opportunity for GNS Science, and our partners and stakeholders, to drive transformational system change. We look forward to engaging in robust discussions throughout this process and will continue to play our part in delivering a modern, future-focused research system for Aotearoa New Zealand.

New Zealanders live on top of an active plate boundary. The geological hazard posed is frequently realised and has a significant impact on the country's economy and social wellbeing. GNS Science has unique capability and an excellent track record in preparing for and responding to natural hazard and extreme weather events. We are leaders in cross-system research to better understand and manage our exposure to natural geological hazards and the impacts of climate change. Our significant expertise, resources, and networks are critical to Aotearoa New Zealand's economic and social wellbeing, and we have an unwavering commitment to our role in supporting response and recovery.

GNS Science is proud to contribute to the international research community, benefiting science on a global scale. We foster strong international partnerships that build Aotearoa New Zealand's reputation for science excellence and demonstrate the value of investing in New Zealand research and innovation. We know the power of global collaboration, having supported geothermal development for over 60 years in more than 35 countries. Our presence in Tokyo and strong leadership in connecting the Pacific Ring of Fire demonstrate our commitment to delivering on Aotearoa New Zealand's global ambitions. We are an important international catalyst, exporting home-grown geothermal research and initiatives.

## CHALLENGES

GNS Science is ambitious. We are excited by opportunities ahead to demonstrate our science excellence and impact. However, the investment needed to realise our ambitions will require improved financial performance. We must improve the profitability of our research and commercial work and better steward the cost of supporting our operations. Optimising our financial management will require strong and dedicated focus to ensure that we can continue to invest in our people, infrastructure, and science assets.

In the short-term, difficult economic conditions and a changing operating environment are adding to the fiscal challenge. The funding signals in the Government's 2024 Budget, combined with our forecast of reduced revenue over the next several years, mean we need to make cost savings across all aspects of our expenditure. To manage this, we have a financial sustainability change programme under way that includes considering the size of our workforce. Ensuring GNS Science is financially sustainable will mean we can continue to deliver critical science now and in years to come.

We have a range of buildings, resources, and technologies that require investment because they are nearing the end of their useful life or are no longer fit-for-purpose. We need to invest in our infrastructure to deliver on our future research ambitions and to enable the continuation of existing research and services.

We are immediately focused on optimising our facilities and prioritising our most critical future investments. We will continue to engage in discussion with our partners about shared infrastructure requirements and seek opportunities to align our resource investments for mutual benefit.

Recent events have highlighted the fractured nature of the hazards and risks management system in Aotearoa New Zealand, including the funding approach. To address these challenges, we will continue to work in close collaboration with stakeholders on hazards monitoring and advisory services.

Meaningful partnership is critical to ensure that science research translates to impact. GNS Science is committed to leveraging opportunities to collaborate, coordinate, share resources, and align strategic agendas with our customers, partners, and collaborators. We will continue to work across the science, innovation, and technology system to generate solutions to the challenges facing our customers, partners, Government, Māori, and society. GNS Science is a critical contributor to the Government's goals of building a resilient and robust economy, improving the wellbeing of all Aotearoa New Zealanders, and protecting and enhancing our country's assets.

We are committed to delivering the strategies and initiatives set out in this Statement of Corporate Intent. We look forward to leading GNS Science confidently forward to deliver on our aspiration for a cleaner, safer, more prosperous Aotearoa New Zealand for current and future generations.



**David Smol**  
Chair



**Chelydra Percy**  
Chief Executive

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# OUR PURPOSE – TŌ TĀTOU TUMANAKO

**To undertake research that increases Aotearoa New Zealand’s resilience to natural hazards, enhances our understanding of geological and Earth-system processes, drives innovation and sustainable economic growth in Aotearoa New Zealand’s energy sector and develops new materials, products and approaches to assist other agencies with sustainable management of risk, environment, and natural Earth and groundwater resources.**

(GNS Science Purpose)

## OUR VISION

A Cleaner, Safer, More Prosperous Aotearoa New Zealand.

Our expertise contributes to this vision by:

- building intergenerational wealth and wellbeing by understanding freshwater, energy and mineral resources
- protecting our economy by reducing the impacts on society (physical and economic) from geological hazards, including through forecasting, improved hazard awareness and preparedness, enhanced geohazards monitoring, and developing more resilient communities and buildings
- understanding past climates in order to improve global models that are used to forecast the future impacts of a changing climate, including critical tipping points

- creating new value for industry by developing and applying novel technologies such as nano-scale devices and isotope measurements
- ensuring Earth science data and physical collections have enduring value to our Earth science research and through wider utilisation of data streams and collections.

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**OUR WORK IS HIGHLY COLLABORATIVE, WITH DEEP LOCAL AND GLOBAL PARTNERSHIPS ACROSS THE FULL SPECTRUM OF OUR RESEARCH.**  
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GNS Science  
Geomechanics Lab, Avalon

## ABOUT US

GNS Science, Te Pū Ao, is one of seven Crown-owned research institutes. As the National Institute for Geological and Nuclear Sciences, we undertake research that drives innovation and economic growth. We are focused on delivering benefits for the people of Aotearoa New Zealand from natural processes occurring in the Earth's crust and Earth surface processes that directly affect our infrastructure, industry and environment.

With around 530 staff at five sites across Aotearoa New Zealand and a representative in Japan, GNS Science draws on a heritage of over 150 years of excellence in Earth sciences. We undertake a wide range of activities from basic research through to applied science, technology development and knowledge translation.

Our work is highly collaborative, with deep local and global partnerships across the full spectrum of our research. This partnering approach enhances our contribution to world-leading science and enables us to adapt it for Aotearoa New Zealand's benefit, to deliver highly relevant, tailored research, science and technology to central and local government, industry and iwi / Māori.

GNS Science champions the value of cross-system and interdisciplinary research collaborations. To deliver meaningful solutions to those who most need our science, we form teams across institutions and research disciplines, reflective of the growing diversity of Aotearoa New Zealand society.

**530**  
STAFF

**5**  
SITES ACROSS  
AOTEAROA  
NEW ZEALAND

**150+**  
YEARS OF EXCELLENCE  
IN EARTH SCIENCES

# OUR DIRECTION - TŌ TĀTOU AHUNGA

## SCIENCE ROADMAP

GNS Science's Science Roadmap identifies where we can best deliver benefit through our research for future stakeholders and New Zealanders and realise our vision. It illustrates the critical contribution GNS Science will make to New Zealand's long-term energy needs, sustainable use of our natural resources, climate goals, and infrastructure development to support economic growth.

We are contributing to a 30-year vision for Aotearoa New Zealand aligned with Treasury's Living Standards Framework and United Nations (UN) Sustainable Development Goals. Our contribution will help Aotearoa New Zealand:

- enable industry, innovation, infrastructure and economic growth
- achieve its long-term energy needs
- meet climate action goals (carbon net zero 2050)
- have sustainable and resilient environments, ecosystems and societies
- secure its freshwater

When mapped to the UN Sustainable Development Goals (SDGs), our science direction contributes to the following SDGs.







GNS Science Technician, Geological Research Labs and Collections, National Isotope Centre

The Roadmap outlines the scientific research that GNS Science will put in place to ensure that our projected impact is delivered.

We recognise that as the priorities of our stakeholders, including central and local government and major industry partners change or evolve, the Roadmap also needs to be reviewed and refreshed.

## ORGANISATIONAL STRATEGY

GNS Science is developing an overarching organisational strategy that will guide our work across the organisation.

The Science Roadmap gives clarity about what we aim to do, aligning our science direction with national priorities and the needs of our stakeholders, partners and communities. The organisational strategy being developed will provide clarity about how we do it. It will enable the business decisions and financial performance that will deliver our vision. It will provide guidance in maintaining and developing the critical scientific capability, services, and support that drive evidence-based decision-making and economic growth.

Together these key documents will support decision-making and focus our efforts. They will provide clarity as to how and what initiatives and programmes will be delivered as we work towards our vision for the future.

## OUR IMPACT BY 2032

### GNS Science will contribute to the following:



**Energy**

Bring more than \$5 billion back into the Aotearoa New Zealand economy by 2032 and reduce our annual energy emissions by up to 30 million tonnes through a science-led transition to locally produced low-carbon energy.



**Hazard and Risk**

Greater resilience to a significant geohazard event through a range of planning, regulatory, and education measures, improved response, and improved forecasting of scale and breadth of impact. Combined, these efforts could save hundreds to tens of thousands of lives and reduce economic shock by billions of dollars.



**Environment and Climate**

The connectivity of environmental systems is understood and a plan in place to protect our groundwater. We will be able to forecast and minimise the impact of our activities on the environment and adapt effectively to unavoidable change. We will contribute scientific knowledge and implement actions to reduce anthropogenic atmospheric CO<sub>2</sub> which could have an Emissions Trading Scheme value of \$2 billion by 2032.



**Kaitiakitanga**

Not only will the potential resources, energy, environments, hazards and origin of Te Riu-a-Māui / Zealandia be valued, understood, respected, protected and restored, we will have a comprehensive plan to monitor our changing environment so current and future generations can live sustainably and resiliently in Aotearoa New Zealand.

# Mahia Framework

## Manaaki

*Showing respect, support, care, generosity and protection for others.*

Our Iwi / Māori relationships demonstrate a robust Māori engagement process while implementing our long-term science direction.

## Ara

*Awaken the past, rise, path, be open with purpose.*

Acknowledge and enable mātauranga Māori-led, GNS Science-enabled research development activities to shape Vision Mātauranga outcomes that produce world-class research.

## Hinengaro

*Thoughts, ideas, mind, heart, feelings.*

Describe how we engage with Iwi / Māori to develop research, technical and cultural expertise to recognise and support mātauranga Māori and shared outcomes with and for our ongoing relationships with Iwi / Māori.



## Āhua

*Character, nature, condition, appearance.*

Enable innovative approaches that enhance both internal and external expertise and capability in Earth sciences, Te Pū Ao me te Ao Māori.

## Ihi

*Essential, dynamic force and excitement.*

Develop our people and processes with Iwi / Māori through increased research, technical and cultural skills to support both mātauranga Māori and science thought leadership outcomes through our relationships.

## TE PUNAWAI O RANGIĀTEA – OUR MĀORI STRATEGIC PLAN

GNS Science is committed to increasing our understanding of Māori science needs and expectations. To support this outcome, we are guided by Te Punawai o Rangiātea, our Māori Strategic Plan.

Meaning ‘the flourishing pool of knowledge’, Te Punawai o Rangiātea provides critical guidance and direction to enable GNS Science to create enduring and sustainable relationships with tangata whenua – iwi, hapū, whānau and Māori. It details our shared moemoea (vision), whaingā (mission), tikanga (values), kawa (actions) and kaupapa (outcomes).

Developed with GNS Science staff and reflective of the organisation’s Science Roadmap, Te Punawai o Rangiātea guides our approach to engagement and establishes ‘MAHIA’, a GNS Science Māori cultural model to support staff in their engagement with iwi / Māori.

By explicitly weaving the future interests of iwi / Māori into our Science Roadmap, building Vision Mātauranga into our research and actively using mātauranga Māori in our work, we are demonstrating our commitment to the principles of participation, protection, and partnership.

Our goal is to build more opportunities for iwi / Māori to lead significant research programmes and grow capability and capacity to contribute to long-term intergenerational wellbeing and change. We continue to gain a deeper understanding of mātauranga Māori and how it contributes to our work, but there is much to do. We are on a journey with our iwi / Māori partners and are committed to bold leadership and delivery of mutually beneficial outcomes.

TE PUNAWAI O RANGIĀTEA GUIDES OUR APPROACH TO ENGAGEMENT AND ESTABLISHES ‘MAHIA’, A GNS SCIENCE MĀORI CULTURAL MODEL TO SUPPORT STAFF IN THEIR ENGAGEMENT WITH IWI / MĀORI

# OUR CHANGING ENVIRONMENT – TŌ TĀTOU TAIAO HURIHURI



Installing a seismometer in  
Central Hawke's Bay

## GOVERNMENT PRIORITIES

GNS Science has a strong track record of working collaboratively with industry, Government and other participants in the science system.

The Government has recently established a new Science System Advisory Group to provide advice on strengthening the science, innovation and technology system. Chaired by Professor Sir Peter Gluckman, the Group is looking into issues facing the sector, as well as the aspirations and opportunities for growth. The Group will deliver two reports on the system, with the first report due mid-year, and the second end of October.

The stated aspiration for the Science System Advisory Group is to build a thriving science, innovation and technology system that delivers growth for New Zealand's economy, environment and society by:

- Driving innovation and accelerating the shift towards a knowledge-based, diversified economy.
- Developing innovative solutions to emerging challenges such as climate change, biodiversity loss, and sociological change.

- Adapting to, and making good of opportunities provided by, a rapidly evolving global research landscape.
- Enhancing Government's effectiveness through the use of scientific data, knowledge, and new technologies.

GNS Science is looking forward to working with the Group, government agencies, Crown Research Institutes (CRIs), and others in the science, innovation and technology system on this exciting initiative.

The Government's 2024 Budget confirmed that we are continuing to operate in a tight fiscal environment. GeoNet and the National Seismic Hazard Model (NSHM) received a multi-year funding allocation, with stepped reductions in funding levels through to 2028 and beyond. Securing a multi-year allocation is a positive outcome. However, the programmes will need to find efficiencies and costs savings to operate at reduced funding levels, and we will continue to work with our partners to secure additional funding where possible.

Central government agencies are currently undergoing significant change in response to new directions and budget requirements set by the Government. This means they are making changes to their operating models that will enable them to work as efficiently and effectively as possible to support Government commitments. These changes will impact the work of GNS Science in the coming years.

GNS Science has work programmes and contracts that support Government policy development by providing the information required for evidence-based decision-making and direction setting.

GNS Science is actively responding to these challenges and the opportunities they provide. We continually seek to improve our performance through strategic partnerships and investments. To reach our goal of financial sustainability, GNS Science will continue to leverage opportunities to collaborate, coordinate and share resources with our partners and collaborators.

# OUR SCIENCE – TŌ TĀTOU PŪTAIAO

GNS Science’s Science Roadmap enables us to focus our research to support national and international collaborative science initiatives, enhancing capability and science value. Delivery of our Science Roadmap is supported by Theme Plans that have been designed to ensure we play our part in delivering impactful and relevant science for the country.



## OUR FOUR SCIENCE THEMES ARE:

-  **Natural Hazards and Risks**
-  **Environment and Climate**
-  **Energy Futures**
-  **Land and Marine Geoscience**

Through our four Science Themes, we contribute international thought-leadership and deliver practical solutions of high relevance to our major stakeholder sectors and end-users. Our investment in multi- and inter-disciplinary methods, such as Data Science and Social Science, enables us to provide linkages across our Science Themes to provide data-driven, outcome-oriented science for the benefit of all New Zealanders.

Driven by Te Punawai o Rangiātea – our Māori Strategic Plan we seek to strengthen our engagement with iwi and hapū, providing avenues to collaborate and/or partner in research planning, execution and outputs. Where possible, we involve local iwi / Māori in research prioritisation, design, planning, implementation, and report writing. Results are discussed and disseminated to relevant groups through hui and other information transfer mechanisms.

GNS Science Theme priorities were identified in our Theme Plans using an outcome-oriented approach and following stakeholder engagement. The global and national drivers, focus and impacts of the four Science Themes are described in more detail in the following sections, along with the measures that will demonstrate the impacts of our work over the next three years. The overall performance of GNS Science is monitored against the set of GNS Science Key Performance Indicators (KPIs) shown in Appendix One.

# NATURAL HAZARDS AND RISKS – NGĀ MATEPĀ ME NGĀ TŪRARU Ā TĀIAO

GNS Science has a national leadership role in monitoring and researching the causes, risks and consequences of geological hazards in Aotearoa New Zealand. We work to increase resilience to natural hazards and reduce the risk from earthquakes, volcanoes, landslides and tsunamis.

## THE CHALLENGE

High rates of natural hazards and significant consequences are to be expected in a nation straddling a plate boundary in the middle of the Southwest Pacific. There is growing evidence that climate change and sea level rise is exacerbating weather-related and coastal hazards. At the same time, the impacts of hazard events are intensifying through population growth and ageing, continued urbanisation, and business vulnerabilities of fast-moving consumer goods and just-in-time supply chains. Risk is increasing and Aotearoa New Zealand's ability to respond to events such as ex-Tropical Cyclone Gabrielle and manage future impacts from natural hazards is being tested.



## GNS SCIENCE'S ROLE

GNS Science has a national leadership role for research on the causes, consequences and risks of geological hazards to increase Aotearoa New Zealand's resilience. We have extensive scientific knowledge in Earth processes, and globally recognised expertise in hazard and risk modelling, forecasting socio-economic impacts of events, and system modelling of consequences and resilience options. Our outcome-oriented research spans the full value chain of information, from underpinning knowledge through to risk management options to help communities mitigate their destructive effects, and advice on policy and regulation.

Through GeoNet, and with the support of our underpinning science, we are building on more than two decades of operating a world-class geohazards network delivering data for geohazards research and monitoring. As an integral component of GeoNet, the National Geohazards Monitoring Centre Te Puna Mōrearea e te Rū provides 24/7 active monitoring of Aotearoa New Zealand's geological hazards.

We provide science advice on geological hazards to support Civil Defence and Emergency Management (CDEM) through the CDEM Act. This means that when an event occurs, we may be required to provide advice on consequences and risk.



Landslides in Hawke's Bay following Cyclone Gabrielle

## WORKING TOGETHER

GNS Science is working across the resilience and science systems as a major coordinator of key research providers and data suppliers in the university, CRI, central and local government, and private sectors. Our work involves collaboration with a wide range of users, through engagement with communities, iwi / Māori, industry bodies, government agencies and the hazard management sector. We communicate through multiple channels to ensure stakeholders understand and manage the risks in their areas/roles.

The Natural Hazards and Risks theme also works with Centres of Research Excellence and other major collaborative programmes, to ensure that GNS Science's work complements and adds value to the work of others.

**Our research aims to generate important scientific knowledge and drive its uptake and use to improve resilience to natural hazards at national, regional, business, community and individual levels.**

## OUR GOALS 2024-27

- |  |   |
|--|---|
| <b>1</b> Understanding Geohazards Processes                | <ul style="list-style-type: none"> <li>Increased understanding of the complex physical processes that generate natural hazards.</li> </ul>  |
| <b>2</b> Stewardship of National Capability                | <ul style="list-style-type: none"> <li>Provide stewardship of critical geohazards data, hazards models and risk tools, monitoring infrastructure and nationally important capability.</li> </ul>  |
| <b>3</b> Trusted Science Advice                            | <ul style="list-style-type: none"> <li>Provide trusted science advice for effective risk reduction, readiness, response to and recovery from emergencies.</li> <li>Understand and respond to the requirements of stakeholders in the planning and delivery of our research.</li> </ul>                                    |
| <b>4</b> Knowledge Exchange                                | <ul style="list-style-type: none"> <li>Act as knowledge brokers for the hazards and risk management system.</li> <li>Cross-disciplinary and cross-organisational coordination to deliver maximum benefits for science investments.</li> </ul>   |
| <b>5</b> Community Resilience                              | <ul style="list-style-type: none"> <li>Apply a social science and people-centred systems approach to enable, empower and support communities to build resilience.</li> </ul>  |
| <b>6</b> Natural Hazard Risk Management System Improvement | <ul style="list-style-type: none"> <li>Improved natural hazard risk management policy and practice.</li> <li>Provide impact forecasting by extending monitoring to include the ability to provide timely impact information and forecast what will happen next (over timeframes of hours to weeks to decades).</li> </ul> |

## 2024/25 DELIVERABLES

The following research initiatives represent some of the key deliverables for the 2024/25 year as we progress towards our longer-term goals:

- 1 A natural hazards short course is scoped and delivered (landslide, risk or earthquake), including investigating the range of funding models.
- 2 Work with partner agencies to agree and implement the 2024/25 GeoNet and National Seismic Hazard Model programmes of work, aligned with the Government Budget 2024.
- 3 Complete a new decadal work plan for geological hazards and risk model development and regular revision cycles, including the use of RiskScape™, MERIT and other socio-economic tools for assessment of both qualitative and quantitative risk metrics.
- 4 Deliver a discussion paper on the requirements for impact-based forecasting for engagement with decision-makers.



Whareongaonga landslide  
near Gisborne

# ENVIRONMENT AND CLIMATE – TE TAIAO ME TE ĀHUARANGI



GNS Science generates evidence and knowledge that enables informed decision-making and governance in response to our changing environment and climate. Our work improves the sustainable management of, and increases the economic returns from, groundwater resources.

## THE CHALLENGE

Aotearoa New Zealand's extensive groundwater resources account for roughly 40% of our drinking water and contribute up to 80% to the annual river flow volume. However, groundwater resources are under threat. Approximately 40% of our groundwater catchments are vulnerable to shortage or contamination, and 71% of monitored groundwater quality sites are not meeting drinking water standards. Emerging organic contaminants and nutrients from land use could make some groundwater resources unusable, and reducing groundwater quality and quantity will increasingly impact on mahinga kai and cultural practices. In addition, climate change and sea level rise

will increasingly impact Aotearoa New Zealand's groundwater resources, for example by increasing salinity and groundwater inundation in coastal aquifer areas.

The impact of anthropogenic greenhouse gas emissions on our climate is unequivocal, with average temperatures on track to reach 1.5°C warmer than pre-industrial temperatures between 2030 and 2052. Warming is likely to continue to increase through the 21<sup>st</sup> century, unless large emissions reductions are achieved, and significant quantities of carbon dioxide are ultimately removed from our atmosphere. We need to improve our ability to project and forecast how our climate may change and identify tipping points and thresholds in the system so that we can reduce

or avoid climate surprises. We need to find ways to measure and account for our greenhouse gases while developing mechanisms to reduce our emissions. We need to adapt to unavoidable change as our oceans warm, pressure on freshwater resources increases, sea level rise affects coastal communities and infrastructure, and extreme weather events become more common and intensify.

Addressing these challenges requires an interdisciplinary approach to include researchers, policy-makers, educators, engineers, and communities across Aotearoa New Zealand. The challenge requires a nationally coordinated effort with engagement across a number of research institutes.





## GNS SCIENCE'S ROLE

We are developing a more comprehensive understanding of freshwater systems to provide new insights and improve policy, management and restoration approaches. New technologies and science methods enable us to better document Aotearoa New Zealand's groundwater resource and evaluate its vulnerabilities.

Our Earth system scientists uncover the Earth's long-term geological data, allowing us to examine how marine and terrestrial ecosystems, coastal environments, and Antarctica's ice sheets responded when average surface temperatures were like those we will experience in the coming decades. This insight improves our ability to anticipate and adapt to future change.

We are experts in analysing and monitoring carbon budgets for Aotearoa New Zealand towns and cities, to better inform decisions on emissions mitigation approaches. Our air particulate matter research enables us to monitor air quality and guide local government in better understanding and managing air contaminants and their sources.

As sea levels rise, we must understand the effects on our coastlines and the communities living there. By studying the response of our coastal systems to previous episodes of warmer-than-present climate and major environmental change we can anticipate how coastal ecosystems will change in the future. Our work on ice sheets allows us to reduce uncertainty regarding the rate and magnitude of sea level change. By measuring and modelling coastal land movement we can provide location specific sea level projections for planning and adaptation to rising or falling seas.

## WORKING TOGETHER

GNS Science is part of a wider system of environmental and climate change research. We have deep collaborations with a range of research teams nationally and internationally. This is supported through cooperative research enabled by various large-scale research initiatives like the Antarctic Science Platform, MBIE Endeavour research programmes and joint initiatives with other CRIs, such as the National Environmental Data Centre.

Working in more connected ways enables our research contributions in groundwater, air quality and climate change to complement efforts by others. Together, we are developing and refining more accurate environmental and climate models and forecasts, enabling more effective communication of expected future impacts. Through collaboration, we are providing tailored guidance, models and tools to mitigate the risks to and from our changing natural world.

**Our research aims to understand and mitigate the impact we are having on the world’s environment and how this will affect our communities both now and for generations to come. Working with our major partners, we have designed our programmes to meet their current and future needs.**

### OUR GOALS 2024-27

<b>1</b> Freshwater Security and Quality	<ul style="list-style-type: none"> <li>Measuring, mapping and modelling groundwater systems.</li> <li>Recognising the social, environmental and cultural value of Aotearoa New Zealand’s groundwater.</li> </ul>
<b>2</b> Antarctic Climate and Ice Dynamics	<ul style="list-style-type: none"> <li>Developing and improving understanding of how ice shelves, ice sheets and sea ice will change as temperatures increase and how this will impact the Southern Ocean and Aotearoa New Zealand.</li> </ul>
<b>3</b> Ecosystems and Biodiversity	<ul style="list-style-type: none"> <li>Enhancing tools and models to increase understanding of the effect of previous episodes of climate change on plankton in our oceans and native terrestrial flora.</li> <li>Characterising the state of our lake systems prior to the influence of human activity and analysing the signals of environmental change in these systems.</li> </ul>
<b>4</b> Our Climate System through Time	<ul style="list-style-type: none"> <li>Generating records of past climate from sediment layers and ice cores to identify and examine patterns not currently captured in short-term datasets (e.g., thermometers and satellites).</li> <li>Identifying thresholds and tipping points in the climate system to improve our ability to model and project future climate.</li> </ul>
<b>5</b> Carbon Cycle and Atmospheric Emissions	<ul style="list-style-type: none"> <li>Improving Aotearoa New Zealand’s national and regional carbon budgets in order to meet its national and international commitments.</li> <li>Examining carbon fluxes in the Southern Ocean and short- and long-term sequestration potential into our coastal- and land-based ecosystems.</li> </ul>
<b>6</b> Sea Level Rise and Coastal Change	<ul style="list-style-type: none"> <li>Understanding the causes, rate, and magnitude of past, present, and future sea level change and its impact on Aotearoa New Zealand and the South Pacific.</li> <li>Connecting our ice sheet research with global sea level datasets and coastal vertical land movement to improve regional projections of sea level.</li> <li>Incorporating sea level research results into groundwater, coastal hazard and risk models to guide climate change adaptation policy and planning.</li> </ul>
<b>7</b> Contaminant Pathways in the Earth System	<ul style="list-style-type: none"> <li>Understanding the processes that allow contaminants to enter and transit through the geosphere (rock and soil), atmosphere, and hydrosphere (oceans, lakes, and groundwater).</li> <li>Developing mechanisms to mitigate or inhibit the transit of contaminants through our Earth system.</li> </ul>

### 2024/25 DELIVERABLES

The following research initiatives represent some of the key deliverables for the 2024/25 year as we progress towards our longer-term goals:

- 1** Model biogenic carbon fluxes across Aotearoa New Zealand’s urban areas and assess the potential of carbon offsets from the urban biosphere, to being included into future National Inventory Reports (in partnership with the Ministry for the Environment).
- 2** Develop a national map of groundwater age.
- 3** Obtain a new geological record of West Antarctic Ice Sheet response to past increases in global surface temperature from beneath the Ross Ice Shelf.
- 4** Estimates of sea level rise commitments from Antarctic Ice Sheet melt are integrated into at least one local authority long-term environmental management plan.

# ENERGY FUTURES – PŪNGAO MŌ ANAMATA



Wairakei power station, Taupō

**GNS Science is focused on geothermal, hydrogen and other technologies that create significant opportunities for new industries. We work to discover new energy solutions that increase security of supply and economic benefit.**

## THE CHALLENGE

Energy powers our economy and underpins the wellbeing of our communities. It enables us to live healthy, fulfilling lives. We use it to power our homes and workplaces, grow and manufacture our food, building materials, clothes and other necessities, and move our people. It is critical for clean water, health care, transport, reliable lighting, and telecommunications.

Energy generation and use are inextricably linked to environmental impacts, including greenhouse gas emissions. Like other countries, Aotearoa New Zealand is grappling with how it can meet changing demands for energy, without causing irreversible impact to our environment. There is growing demand for a low-carbon renewable energy supply and more equitable access to energy resources.

Technologies that increase electrification, use bioenergy and hydrogen, and provide demand management will be key to this clean energy future.

Aotearoa New Zealand has committed to double electricity generation by 2050 to meet the increased demand for low carbon energy sources to power transport, industry and homes. A significant load for reducing emissions falls to the energy system, which is currently heavily reliant on fossil fuel products. Progress towards this goal and international commitments to reduce energy emissions, that have been set since the early 1990s, falls short of the targets. Science can play a critical part in identifying and developing innovative solutions to reduce the emissions of carbon dioxide to the atmosphere from energy production and use.



*Collecting magnetic measurements, Pōhutu Geyser, Rotorua*

## GNS SCIENCE'S ROLE

GNS Science plays a major role in enabling Aotearoa New Zealand's transition to a low-carbon energy future. We invest in diverse research to grow Aotearoa New Zealand's renewable energy supply, develop new materials for producing and storing hydrogen, and reduce energy-related emissions, all with minimised environmental impacts.

The solutions that result from our research will reduce our national carbon footprint, while enhancing Aotearoa New Zealand's energy security and resilience, and economic competitiveness.

Our research into materials leverages advances in global research and development (R&D) to develop regional opportunities to produce and export green hydrogen. Efficient use of renewable energy is another area where our science contributes to the way Aotearoa New Zealand reduces its carbon emissions. Our focus on new materials reflects increasing demand for new technologies, processes and materials that reduce energy demand (and carbon intensity) and develop new paradigms for energy generation and efficiency on the supply-side.

Energy systems are vulnerable to climate-related and socio-political events. This emphasises the need for a secure, resilient indigenous energy supply in Aotearoa New Zealand. This outcome is a focus of the energy research GNS Science is currently undertaking.

Increasing the domestic supply of energy has the potential to produce negative environmental and social effects. Our research into the sustainable use of energy aims to develop methods that incorporate community values into the assessment of the impacts of utilising energy resources.

## WORKING TOGETHER

In line with Government goals to grow private-sector-led R&D activity, we foster external partnerships to focus our research where there is high industry demand.

We expect our research to underpin the creation of new, high-value industries in Aotearoa New Zealand and also develop new value streams for export.

Our expertise in geothermal energy is sought by companies in Aotearoa New Zealand and overseas. We are building on our international agreements including:

- The GNS Science-JOGMEC (Japan) Memorandum of Understanding (MOU) on geothermal energy technical cooperation
- Ministry of Business, Innovation and Employment (NZ)-Department of Energy (USA) agreement on R&D of geothermal technologies
- The New Zealand-Japan MOU to develop hydrogen technologies.

These agreements enable us to collaborate with overseas researchers and to provide our expertise to government bodies and companies to help reduce global carbon emissions.

**Our research aims to increase opportunities to use renewable resources and efficiency gains to reduce carbon emissions from energy use and to grow energy resource security.**

## OUR GOALS 2024-27

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|---|---|
| <p><b>1</b> Growing the Use of Geothermal Energy, with a Particular Focus on New Resources</p>  | <ul style="list-style-type: none"> <li>• Build capability and provide understanding that supports increased sustainable and innovative use of geothermal energy to reduce Aotearoa New Zealand's carbon emissions and enhance wellbeing. This includes both hotter supercritical fluids and shallow geothermal energy that can be used directly for industrial process heat.</li> </ul> |
| <p><b>2</b> Growing an Aotearoa New Zealand Hydrogen Economy</p>                                | <ul style="list-style-type: none"> <li>• Design and develop materials, tools and technologies to overcome the scientific, engineering, social and economic barriers in implementing hydrogen as a zero-carbon energy carrier and industrial feedstock.</li> </ul>   |
| <p><b>3</b> Developing New Clean Technology Industries Based on Advanced Materials Research</p> | <ul style="list-style-type: none"> <li>• Create, characterise and integrate new materials systems to underpin the clean technologies that will deliver a sustainable and resilient net-zero carbon energy future for Aotearoa New Zealand.</li> </ul>   |
| <p><b>4</b> Using the Earth for New Energy Storage</p>  | <ul style="list-style-type: none"> <li>• Use the subsurface as a machine for storing or producing energy.</li> <li>• Use the subsurface to capture emissions.</li> </ul>  |
| <p><b>5</b> Modelling and Analysing Aotearoa New Zealand's Energy System</p>                    | <ul style="list-style-type: none"> <li>• Provide information and data that propels Aotearoa New Zealand to a just transition to a net-zero carbon energy future.</li> </ul>   |

## 2024/25 DELIVERABLES

The following research initiatives represent some of the key deliverables for the 2024/25 year as we progress towards our longer-term goals:

- 1** Review carbon sequestration potential and the future of carbon management regulation.
- 2** National scale heat flow models will be developed from thermal gradients, rock properties and transient processes to identify areas of elevated temperatures.
- 3** An electrochemical green ammonia production system employing catalyst materials developed by GNS Science will be tested and demonstrated.
- 4** Progress discussions with the Government and industry round a joint supercritical geothermal initiative.

# LAND AND MARINE GEOSCIENCE - PŪTAIAO ARONUKU Ā-WHENUA, Ā-MOANA



Geological maps of Te Riu-a-Māui / Zealandia

**GNS Science's expertise in geological and Earth system processes generates new knowledge about our continent. This new knowledge is critical for understanding the causes and impacts of geological hazards, and understanding economic opportunities relating to the exploration of geologically based resources.**

## THE CHALLENGE

The islands of Aotearoa New Zealand represent the small portion (around 6%) of Earth's eighth continent of Te Riu-a-Māui / Zealandia that is above sea level. The vast majority of Te Riu-a-Māui / Zealandia's nearly five million square kilometre area is submerged, and 60% of this area is within Aotearoa New Zealand's jurisdiction.

There is still much to discover and understand regarding Aotearoa New Zealand's onshore geology and active geological processes, and how they relate to a sustainable economy and resilient society. There are even greater frontier continental-scale challenges, opportunities and stewardship responsibilities in revealing and managing the portion of Te Riu-a-Māui / Zealandia that underlies the South Pacific Ocean.

The Land and Marine Geoscience Theme is the storehouse and whare of over 150 years of geological mapping and fundamental underpinning Earth science, skills, knowledge, mātauranga, and learning. That broad authoritative knowledge has a crucial role in determining how successfully Aotearoa New Zealand manages understanding global-scale environmental change, variability and impacts, improving predictive capability for hazards and disasters, identifying new sustainable resources, and developing transformational new technologies to make new discoveries.

## GNS SCIENCE'S ROLE

Our work generates knowledge about our continent and oceans. Fundamental geoscientific research undertaken by GNS Science plays an essential part in providing an accurate and up-to-date understanding of Aotearoa New Zealand's natural geological and biological environment. It also adds to iwi / Māori knowledge of culturally, environmentally and economically significant solid Earth materials and processes.

Deeper knowledge of fundamental Earth deformation and plate boundary structure and processes is critical for research on the causes and impacts of geological hazards such as earthquakes, landslides and volcanoes. This enables us to strengthen our resilience to risk.

In a low-carbon future, there will be continuing demand for a sustainable, secure supply of energy and critical minerals and elements. GNS Science's work provides accurate appraisal of Aotearoa New Zealand's on-land and offshore resource potential to enable sustainable custodianship of the continent's natural resources.

## WORKING TOGETHER

GNS Science coordinates geoscience research initiatives in Aotearoa New Zealand, collaborating with government agencies, universities, CRIs, iwi / Māori, and other providers. We lead international initiatives of benefit to Aotearoa New Zealand. We participate in major international collaborative consortia, for example, the International Ocean Discovery Program (IODP) and the International Continental Science Drilling Program (ICDP). These relationships facilitate capability growth and leverage co-funding. They bring significant new knowledge, critical thinking and additional scientific infrastructure and equipment to Aotearoa New Zealand.

These partnerships have allowed us to leverage well over \$150 million of international investment in Land and Marine Geoscience research. Our international partnerships are supported by Memoranda of Understanding and subcontracts, including student co-supervision.

Land and Marine Geoscience provides the data and underpinning research needed for enabling research and accelerating innovation in our other Science Themes. It provides a wider context for tectonic and volcanic hazards, delivers an improved framework for energy, supports management of natural resources, and provides a valuable historical perspective on current and future environmental change.



*Tūhura Papatūānuku Geo Noho  
based at Waimamoni Marae  
(Ngāi Takoto), Far North*

**Our research aims to understand the fundamental geological make-up and nature of the continent Te Riu-a-Māui / Zealandia. It includes research on the physical processes that control geohazards, characterising natural resources and understanding the consequences of past environmental change. Working with the other three themes and external partners, we have designed our programmes to meet the needs of Aotearoa New Zealand.**

## OUR GOALS 2024-27

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|--|--|
| <p><b>1</b> Improved Hazard Forecasting from our Understanding of Plate Boundary Processes</p> | <ul style="list-style-type: none"> <li>• Develop more accurate models of the plate boundary zone to provide better constraints for earthquake and tsunami risk assessment.</li> <li>• Develop greater understanding of earthquake phenomena by communicating understanding of seismic hazards to reduce earthquake risk and promote community resilience.</li> </ul>   |
| <p><b>2</b> Managing Natural Resources Sustainably</p>   | <ul style="list-style-type: none"> <li>• Understand the relationships between tectonism, volcanism and geothermal systems in Aotearoa New Zealand to enhance geothermal resource potential and management.</li> <li>• Quantify how and where critical elements and materials are distributed in the subsurface to support a sustainable transition to a low-emissions future.</li> <li>• Facilitate the use of the subsurface to capture emissions and as a machine for storing or producing energy.</li> </ul>  |
| <p><b>3</b> Understanding Our Changing Landscape</p>   | <ul style="list-style-type: none"> <li>• Develop capability in landscape evolution modelling and exploring the land-to-sea boundary to understand the source-to-sink system of sediment transfer. The focus is on low-lying coastal zones which are particularly vulnerable to the dynamics of natural and human-induced changes.</li> <li>• Advance our ability to measure and model surface processes across land, coastal, and marine settings to provide essential insight into changing environments. This supports Aotearoa New Zealand's response to hazards and climate change.</li> <li>• Understand the diverse submarine landslide tsunami sources around Aotearoa New Zealand to refine existing hazard assessment and mitigation strategies.</li> </ul> |
| <p><b>4</b> Understanding Our Past to Improve Our Future</p>                                   | <ul style="list-style-type: none"> <li>• Provide stewardship of Aotearoa New Zealand's geological history and timescale enabling improved understanding of the rates and scale of change and climate impacts.</li> </ul>   |
| <p><b>5</b> Kaitiaki of Our Continent Te Riu-a-Māui / Zealandia</p>                            | <ul style="list-style-type: none"> <li>• Work closely with international scientific organisations, especially IODP and ICDP, to enhance understanding of global-scale environmental change, variability and impacts, and improve predictive capability for hazards and disasters.</li> <li>• Be kaitiaki of Te Riu-a-Māui / Zealandia geoscience by ensuring our data, knowledge and understanding of the fundamental processes is in a format fit for purpose and used by many.</li> </ul>  |

## 2024/25 DELIVERABLES

The following research initiatives represent some of the key deliverables for the 2024/25 year as we progress towards our longer-term goals:

- 1** In developing GNS Science's approach to critical minerals research, we will assess long-, mid-, and short-term indicators of economic and social interest in critical minerals through engagement with stakeholders.
- 2** Build capability in landscape evolution and surface process modelling to better understand long-term landscape responses to natural hazards and climatic changes including earthquakes, severe weather events and sea level rise.
- 3** Nationally significant and nationally important geoscience datasets have publicly available information on their data management quality and accessibility to promote their data science application and re-use.
- 4** Create new gravity and magnetic grids of the offshore Bay of Plenty that will improve our understanding of the volcanic and tectonic transition between onshore Taupō Volcanic Zone and offshore Havre Trough.



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# SUPPORTING OUR SCIENCE – TŌ TĀTOU PŪTAIAO TAUTOKO

## SOCIAL SCIENCE

To create impact with our science we have to understand the interplay between geological resources and processes, and the people who live on and with them. Through a better appreciation of how society functions, including governance and policy frameworks, we can shape the science that GNS Science invests in, to ensure our research results are useful, usable and used.

We apply our social science expertise to mitigate risks and build resilience to natural hazards by understanding how to influence individuals, communities, and organisations, and supporting the development of Māori resilience frameworks. Embedding social science approaches across our Science Themes allows us to better understand public perceptions and values, identify barriers to adopting new practices and technologies, and ensure effective public discussion on critical issues.

## DATA SCIENCE

Leading-edge techniques and expertise in data science (including Deep Learning, Decision Support Models, Data Lens, and Artificial Intelligence (AI)) can be applied across our Science Themes to make the most of our information and insights.

These are applied to all GNS Science databases (many of which are nationally significant), GeoNet and satellite data to address science problems with AI and machine learning methods. We are investing in data science, firstly to build capability and capacity in relevant disciplines, and secondly to integrate data science approaches across the Science Themes. This enables us to extract more value from GNS Science's significant data resources, for the benefit of the wider science community, and to deliver greatest value and impact for Aotearoa New Zealand.

## STRATEGIC SCIENCE INVESTMENT FUND

GNS Science's Strategic Science Investment Fund (SSIF) investment is an important element in the delivery of our Science Roadmap. This funding provides a stable revenue source to maintain, enhance and foster current or new scientific and research capabilities. Each Science Theme is underpinned by SSIF programmes that provide long-term strategic research to support end-to-end science delivery along the value chain.

Funding from the SSIF Advanced Energy Technology Platform is enabling us to progress our work in creating next-generation knowledge-intensive opportunities for New Zealanders. This will deliver transformative technologies that will drive Aotearoa New Zealand's future as a globally connected 'green hydrogen' economy.

The SSIF Infrastructure Fund provides support for the eight Nationally Significant Collections and Databases of which GNS Science is custodian (see Appendix Two).

A new SSIF Natural Hazards and Resilience Platform has recently been announced and will be hosted by GNS Science.

## EXTERNAL ADVICE

Our Strategic Scientific and User Advisory Panel has an important role in evaluating our science excellence and delivery for and with stakeholders. Reporting directly to our Board, the Panel meets annually to review our research performance, future research directions and capability needs to ensure our research is both excellent and relevant, and that we are taking advantage of key developments in international science and technology.

# OUR ORGANISATION – TŌ TĀTOU ROOPŪ WHAKAHAERE



## HOW WE WORK

Our values articulate who we are, what matters to us and how we operate at GNS Science. Our values are centred around **Manaakitanga** – *we do the right thing*.

At GNS Science, Manaakitanga is about respecting and supporting our people and those we work with.

We want people to not only feel a sense of belonging but know they are cared for and valued.

Manaakitanga is underpinned by the following values:

- We are **Connected** in our purpose with each other, with partners and stakeholders, and with our communities.
- We are **Inspired** by our work to explore, challenge, innovate and aim higher.
- We are **Empowered** to be our best – valued for our differences, encouraged to contribute, enabled to grow and develop.

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## EMBEDDING VISION MĀTAURANGA IN OUR WORK

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### OUR GOAL:

**GNS SCIENCE IS A TRUSTED RESEARCH PARTNER WITH MĀORI, SUPPORTING SHARED ASPIRATIONS, ALIGNING OUR MĀORI RESEARCH EFFORTS WITH NATIONAL PRIORITIES, AND ENSURING A CLEAR LINE OF SIGHT TO OUR SCIENCE THEMES AND PROGRAMMES TO GUIDE FUTURE RESEARCH OPPORTUNITIES.**

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GNS Science is committed to developing enduring and mutually beneficial partnerships with iwi and Māori. Te Punawai o Rangiatea, our Māori Strategic Plan, aims to focus our research efforts on building strong connections with tāngata whenua that recognise and resource mātauranga Māori research efforts across all our research programmes. This includes building career pathways and developing talent through outreach education and scholarship initiatives with academic partner institutes. In addition, efforts to develop staff engagement and cultural awareness skills help improve our research approaches, insights, and impact for our communities.

### Partnering for success

A critical component of our success at GNS Science is building Māori workforce capacity and deepening staff capability to effectively implement Te Punawai o Rangiatea. To do this we:

- Provide learning opportunities for young Māori in the science system through outreach events, our Ahunuku internship scheme and post-graduate scholarships for Master's and PhD students.
- Deepen existing partnerships with iwi and Māori entities to collaborate on research bids that increase our shared understanding of research, mātauranga and science aspirations.
- Collaborate with CRIs, universities, iwi / Māori authorities and other relevant agencies to strengthen cross-sector pathways that contribute to Vision Mātauranga outcomes.
- Build on our Vision Mātauranga capability training for staff to enhance our engagement skills when working with iwi / Māori audiences for research development.
- Contribute to iwi research capability development through secondments, kura whenua, fieldwork and iwi-led research planning and resourcing.

Engaging with iwi / Māori to describe how we interface and integrate Te Ao Māori perspectives into research is a critical component of facilitating both staff and iwi / Māori research partners as we develop research proposals.

As we continue to build partnerships with iwi / Māori, we increase our reputation and visibility amongst Māori communities. This assists us in attracting emerging Māori talent both within GNS Science or contracted to work within Māori agencies to build Earth science capability that contributes to innovative and shared research outcomes in the future.

We are working with other CRIs to develop standard policy around Māori Data Sovereignty. GNS Science holds much data of interest to Māori and our emerging projects will benefit from having consistent CRI-wide approaches and protocols around collecting, managing, safeguarding and returning data that are sovereign to our Māori partners.

### Key initiatives for 2024/25:

- Work with iwi / Māori to identify and plan their research interests and capability priorities and embed them into GNS Science projects.
  - Invest in and expand Māori career pathways within GNS Science by continuing to deliver the Ahunuku Māori Scholarship programme, investing in Master's and PhD students, and delivering the Mātauranga Master's Programme with partner Te Whare Wānanga o Awanuiarangi.
  - Build staff capability through training and the development of Māori-friendly resources, including staff research writing workshops and delivery of te reo classes.
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📍 GNS Science researchers, Avalon

## VALUING OUR PEOPLE

**OUR GOAL:**  
**GNS SCIENCE HAS A LEADERSHIP MINDSET AND A DIVERSE AND INCLUSIVE CULTURE THAT IS PREPARED FOR THE FUTURE OF WORK.**

We aim to build a diverse and inclusive culture, develop our people, and recognise the important and unique value they deliver to Aotearoa New Zealand. Key initiatives to support this include growing skilled, inspiring and visible leaders, building capability of all staff, preparing for the workplace of the future, and recognising and rewarding high performance.

### The value of diversity

We aim to provide a workplace where people are valued for their diverse life experience and perspectives. We harness this diversity to continually improve our research capability and ability to serve communities.

We continue to encourage greater representation of Māori in our workforce, and are working to create a bi-cultural welcoming and supportive culture to support Vision Mātauranga with our engagement and collaborative work with iwi and Māori.

Our Equity, Diversity and Inclusion Committee meets regularly, and their initiatives include speakers to highlight issues and experiences from a diverse range of perspectives, particularly on national days of importance such as Pride week. We also provide unconscious bias training for all people leaders and new employees.

Our employee-led Early Career Staff Network has a commitment to enhancing connectivity, supporting our early-career people and providing pastoral care for our Ahunuku scholars and summer students. We see our young scientists as the people to realise the future of our work as we continue our legacy of science excellence for future generations.

### Investment in capability planning and development

We see all our people as leaders, regardless of position. Building on our current leadership programme, we are developing more targeted learning opportunities for leaders in 2024/25. Our programme of leadership forums will continue, along with other training opportunities for our leaders.

We launched our Management Essentials training module as part of the Workday package. This provides managers with access to a wide range of 'essentials' to develop their manager capabilities.

The Science Roadmap is central in developing the planning for our future workforce. We will continue to support capability through formal training, mentoring, collaboration and connectivity to the wider science community.

### Culture and engagement

As we develop a new organisational strategy we recognise the need to grow our culture to enable its successful implementation. Our new strategy and culture is being developed with our people to ensure we put people at the centre of everything we do. We recognise that our culture, values and ways of working underpin our people's sense of belonging and connection with GNS Science. Creating an equitable culture, in particular with regard to reward and recognition, continues to be a priority.

### Key initiatives for 2024/25:

The focus for 2024/25 is to build on the progress made in the previous year to:

- Prioritise and progress programmes of work that support our organisational performance, including change management to support organisational strategy, developing a business mindset, leadership development and employee relations.
- Review and progress improvements to GNS Science employee engagement strategies to ensure they support implementation of the organisational strategy and the culture needed for sustainable success.

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## HEALTH, SAFETY AND WELLBEING

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**OUR GOAL:**  
SEAMLESS INTEGRATION OF HEALTH AND SAFETY RISK MANAGEMENT INTO ALL GNS SCIENCE ACTIVITIES TO ENSURE THE BEST POSSIBLE SAFETY OUTCOMES FOR OUR PEOPLE AND THE BUSINESS.

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GNS Science workers are exposed to some very hazardous environments and working conditions. Ensuring a work environment that is safe and healthy is an organisational priority. GNS Science also strives for a workplace that is free of psychosocial stressors such as fatigue and workplace bullying. We regularly discuss best practice risk management with other Crown Research Institutes and agencies that face similar hazards to ours, as part of a continual improvement process.

GNS Science invests in health, safety and wellbeing training for all workers, and provides protective equipment, safety monitoring systems and health monitoring, as appropriate to specific work types. There is an emphasis on wellbeing and the active management of identified critical risk. Staff participate in the health, safety and wellbeing management system, via consultation on policies and procedures, and active participation in health, safety and wellbeing committees. Such inclusion has resulted in improved understanding and increased levels of health, safety and wellbeing leadership, ownership, and collaboration throughout the organisation.

We remain committed to ensuring our staff have the capability, as well as the understanding of the influence of their behaviours in ensuring safe outcomes for themselves and others. We have made good progress in developing a more inclusive and responsible health, safety and wellbeing culture in support of GNS Science's vision 'Health and Safety is at our core, empowering everyone, every day, everywhere'.

GNS Science aims to achieve accreditation to ISO 45001 within three years. This will ensure our Health and Safety systems are fit-for-purpose and of a global standard.

### Key initiatives for 2024/25:

- Complete the development of a new critical risk activity programme that will significantly enhance frontline safety and provide robust and measurable outcomes.
- Complete the roll out of a new field party safety management system that ensures a quick response to any serious incident or adverse conditions.

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## CONNECTIVITY AND INNOVATION

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**OUR GOAL:**  
INCREASED FOCUS AND CAPABILITY TO SUPPORT THE GOVERNMENT'S ASPIRATION TO INCREASE SCIENCE COLLABORATION WITH THE PRIVATE SECTOR TO DRIVE INNOVATION AND TECHNOLOGY DEVELOPMENT.

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We aim to be a proactive, responsive, and widely trusted partner to our stakeholders and clients, known for our focus on providing expert guidance and effective solutions to create impact and value for Aotearoa New Zealand. We continue to evolve the way we engage with our major stakeholders and clients, while also ensuring our commitment to them is grounded in mutual respect, meaningful connections and organisational consistency.

The strategic agreements with our international geoscience and isotope science partner agencies in Australia, Japan, Germany, Italy, and the USA remain strong and hold significant potential. The examples of the strategic national memberships continue to enable national access to collaborative resources, including the International Ocean Discovery Program (IODP) and the International Continental Scientific Drilling Program (ICDP).

GNS Science's research relies on the use of advanced technology. We adopt (and adapt) new technologies where they support our work and can deliver effective and innovative solutions, such as gathering, analysing and modelling data. We also create technologies and products that have a real impact.



Examples include the development of models (such as the National Seismic Hazard Model) and our work to develop and implement green hydrogen production and storage technologies.

To grow our innovation focus we have an internal Capability Development Fund, which is used to test and validate new science ideas with potential for impact for Aotearoa New Zealand. This allows us to quickly identify and support new intellectual property or ‘fast fail’ new ideas. It also gives us the opportunity to trial new tools and agile ways of working. We incorporate ongoing training in innovation methodologies for staff, particularly our early career scientists. This is leading to a noticeable increase in involvement of women and early career scientists in the leadership of our science projects. It is also leading to an increase in the number and success of proposals moving forward for research or commercial application.

GNS Science continues to drive commercialisation of intellectual property. Our aim is to lift our ability to create and protect new value from our research and increase its impact for Aotearoa New Zealand’s benefit. We do this in a manner that supports the protection of valuable intellectual property and makes it available to industry partners. This is done on a commercial basis and in a manner that ensures maximum uptake and benefit to society.

**Key initiatives for 2024/25:**

- Increase the commercialisation of GNS Science’s intellectual property, through the identification and development of commercialisation plans for a minimum of three viable opportunities for technology transfer.
- Support staff to tell the GNS Science story and communicate the value and impact we deliver to Aotearoa New Zealand by providing information, tools and techniques for use for external communication and engagement.

## INFORMATION SERVICES AND TECHNOLOGY

**OUR GOAL:**  
**TO EFFECTIVELY MANAGE AND LEVERAGE TECHNOLOGY RESOURCES, UTILISING DATA-DRIVEN STRATEGIES AND DIGITAL TECHNOLOGIES TO OPTIMISE BUSINESS PROCESSES, ENSURE DATA SECURITY, DRIVE INNOVATION, ENHANCE CUSTOMER EXPERIENCES, AND ALIGN TECHNOLOGY INITIATIVES TO ACHIEVE GNS SCIENCE’S OBJECTIVES.**

GNS Science is investing in our Information and Communication Technologies infrastructure and capability. This strategic investment supports our aim to fully leverage the expanding opportunities within the Aotearoa New Zealand science ecosystem, particularly in the areas of high-performance computing and associated data science ventures.

Our focus is on addressing the organisation’s long-term technical debt across our core technology infrastructure and bolstering our security measures to safeguard our assets and operations. We are also fostering and growing our people’s technical expertise as we move to more contemporary digital services. These efforts support our commitment to innovation, ensuring that we remain at the forefront of technological and science advancements and drive transformative outcomes in our field.

**Key initiatives for 2024/25:**

- Progress the phased rollout of a Content Management System aimed at enhancing the consistent management and accessibility of our information for both staff and partners at GNS Science.
- Implement an enhanced network improving the speed, reliability, and scalability, fostering enhanced communication, collaboration, and efficiency across the organisation.
- Implement our cloud transition programme to provide a more flexible approach to the management and storage of data supporting future GNS Science technology activities.
- To bolster data science capabilities at GNS Science, standardise and centralise our scientific computing usage to enhance efficiency and readiness for cloud integration.
- Enhance our security posture uplifting our capabilities across the enterprise validating the impact on its measurable impact to the service, availability, readiness and response capability of GNS Science (as measured by the National Institute of Standards and Technology framework).



*GNS Science technician working on a GeoNet sensor site*

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## SUSTAINABLE FINANCE THAT ENABLES DELIVERY

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### OUR GOAL:

GNS SCIENCE HAS ROBUST FINANCIAL MANAGEMENT THAT DELIVERS:

- **IMPROVED FINANCIAL PERFORMANCE – ENSURING AN APPROPRIATE LEVEL OF MARGIN FROM OUR RESEARCH AND COMMERCIAL WORK AND THAT OUR COSTS FOR SUPPORTING OUR OPERATIONS ARE OPTIMISED, AND**
  - **FINANCIAL INFORMATION AND ADVICE FOR DECISION-MAKING – SUPPORTING OUR PEOPLE WITH THE BEST INFORMATION AND TOOLS TO NAVIGATE THEIR WORK.**
- 

GNS Science is required to operate in a financially sustainable manner. This means that, in addition to securing enough revenue to fund day to day expenses, we must generate sufficient cash flow to ensure we can continue to invest in maintaining and upgrading the assets and infrastructure required to realise our vision and deliver on our goals and objectives.

To deliver excellent science for the benefit of Aotearoa New Zealand, our scientists rely on key science assets, buildings and state-of-the-art scientific equipment. GNS Science has a 10-Year Capital Plan that aims to ensure that we are in a position to maintain our assets and deliver our research outcomes. This Plan continues to evolve to reflect the changing operating environment.

GNS Science has a large range of strategic science infrastructure, much of which has reached the end of its useful life or is no longer fit for purpose. This includes facilities, buildings and resources required to deliver our current research commitments and our future research ambitions outlined in our Science Roadmap.

The level of investment needed to provide our key property and facility needs is significant and cannot be funded from current and forecast GNS Science reserves. In the near term, there is a clear signal that Government funding is not available.

We are operating in a challenging economic climate with significant inflationary pressures. We are endeavouring to improve our bottom-line so we can reinvest in our future, including looking closely at our costs, exploring growth opportunities, and making the most of collaborative working and investments. Growth opportunities include, for example, a change in the Government position on oil, gas and mineral exploration. GNS Science is working with the Ministry of Business, Innovation and Employment and the industry to understand potential opportunities and will take a demand-led approach to commercial work in this area.

GNS Science's approach is to manage our operations to deliver financial performance in the short term and financial sustainability in the long term. This means we need to focus on delivering the margins necessary to ensure sufficient operating cash flows to support long-term investment. We are working to improve delivery of our work through enhanced project management, increasing our focus on delivering agreed outcomes and outputs on time and to budget, and aligned with client, stakeholder and funder expectations.

We have commenced a financial sustainability change programme that includes a review of the capacity and capability required to continue to deliver critical science and science services over the coming years.

Key elements of GNS Science's financial approach are:

- **Improved financial capability.** Ensuring that GNS Science has financial disciplines aligned with our goals and plans, alongside a resource allocation process that delivers our priorities.
- **Delivering improved financial performance.** Ensuring an appropriate level of margin from our research and commercial work and that our costs for supporting our operations are optimised.
- **Delivering financial information and advice for decision-making.** Supporting our people with the best information and tools to navigate their work.
- **Managing our publicly funded resources in a prudent and appropriate manner.**

### Key initiatives for 2024/25:

- Progress the programme of financial improvement initiatives resulting from independent reviews of our system performance. This includes consideration of operational efficiencies and improving the use and useability of the Workday system.
  - Grow revenue from international commercial research activity in areas that align with the GNS Science Roadmap.
  - Define a programme of work to develop a comprehensive Capital Investment Plan, outlining our long-term programme of investment in assets and infrastructure.
  - Complete a risk-based assessment of GNS Science's key assets, their value to the business and their expected lifecycle.
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# FINANCIAL INFORMATION – PĀRONGO PŪTEA

The Financial Projections for the next three years reflect the expectation of a tighter fiscal environment for GNS Science.

GNS Science's revenue is projected to decrease by 3.6% during 2024/25 compared to 2023/24. The main decrease arises from the ending of the Resilience Challenge programme (\$7.3m) and a reduction in SSIF funding as 2023/24 included specific funding for Cyclone Gabrielle. We also anticipate a decrease in our commercial revenue. This is partially offset by a modest increase in revenue for MBIE Contestable and Sub-contracts and the GeoNet and DART programmes.

Expenditure is expected to contract over the next few years, with reduced project costs in line with reduced revenue. Other expenditure has been estimated in line with inflation or reflects increases in line with recent trends.

GNS Science's goal is to operate in a financially sustainable manner and is focused on delivering a consistently better financial performance, which includes ensuring our work is fully costed including an appropriate margin.

GNS Science has commenced a financial sustainability change programme which includes a review of the capacity and capability required to continue to deliver critical science and science services over the coming years. The financial impacts of this financial sustainability change programme have not been incorporated into the financial projections as there are no predetermined outcomes from the review.

	Forecast 2023/24 \$000	Outlook 2024/25 \$000	Outlook 2025/26 \$000	Outlook 2026/27 \$000
<i>Year ending 30 June</i>				
<b>Revenue (\$000s)</b>				
Total revenue	128,046	123,486	120,370	122,112
Revenue growth	7.9%	-3.6%	-2.5%	1.4%
<b>Operating results (\$000s)</b>				
Operating expenditure (excluding depreciation)	118,492	114,901	110,997	112,070
Operating expenditure growth	4.2%	-3.0%	-3.4%	1.0%
EBITDA	9,554	8,585	9,373	10,042
EBIT	2,348	864	1,277	1,556
Net Profit/(Loss) before tax	3,882	2,237	2,398	2,748
Net Profit/(Loss) after tax	2,795	1,610	1,727	1,979
EBITDA per FTE	18	16	19	20
Total assets	91,140	91,518	93,020	94,763
Total equity	42,192	43,802	45,529	47,508
Capital expenditure	11,573	11,185	8,316	10,793
<b>Liquidity</b>				
Quick ratio	2.0	2.0	2.1	2.1
Interest coverage	n/a	n/a	n/a	n/a
<b>Profitability</b>				
Return on equity	7.1%	3.8%	3.9%	4.3%
Operating margin	7.5%	7.0%	7.8%	8.2%
<b>Operation risk</b>				
Profit volatility	53.5%	49.3%	40.8%	27.5%
Forecasting risk	5.3%	5.1%	2.3%	1.4%
<b>Growth/Investment</b>				
Capital renewal	1.6	1.4	1.0	1.3
<b>Financial strength</b>				
Equity ratio	46.3%	47.9%	48.9%	50.1%



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# OTHER INFORMATION REQUIRED BY THE CRI ACT 1992

## SHAREHOLDER CONSENT FOR SIGNIFICANT TRANSACTIONS

The Board will obtain prior written consent of Shareholding Ministers for any transaction or series of transactions involving full or partial acquisition, disposal, or modification of property (buildings, land, and capital equipment) and other assets with a value equivalent to or greater than \$10 million or 20% of the Company's total assets (prior to the transaction), whichever is the lesser.

The Board will obtain the prior written consent of Shareholding Ministers for any transaction or series of transactions with a value equivalent to or greater than \$5.0 million or 30.0% of the Company's total assets (prior to the transaction) including:

- the acquisition, disposal, or modification in a joint venture, partnership, or other similar association;
- the acquisition or disposal in full or in part of shares or interests in external companies, subsidiaries, and business units;
- transactions that affect the Company's ownership of a subsidiary or a subsidiary's ownership of another entity;
- other transactions that fall outside the scope of the definition of the Company's core business or may have a material effect on the Company's science capabilities.

The Board will advise the Shareholding Ministers in writing (in the Quarterly Report) before entering into any transaction below this threshold related to property or to a specific commercialisation venture which involves change in intellectual property ownership or control.

## ACCOUNTING POLICIES

A summary of our Accounting Policies is included in our Annual Report. The current (and previous) Annual Report can be found on our external website: <https://www.gns.cri.nz/about-us/corporate-documents/>

## RATIO OF SHAREHOLDERS' FUNDS TO TOTAL ASSETS

The target ratio of 'shareholders' funds to total assets' is as follows:

Target ratio	2024 Forecast	2025 Outlook	2026 Outlook	2027 Outlook
%	46.3%	46.9%	47.7%	48.6%

Shareholders' funds are defined as the sum of the 'share capital' and 'equity reserves' (otherwise called 'total equity'). Total assets are defined as the sum of the net book value of 'current' and 'non-current assets'. This is 'as disclosed' in the Company's balance sheet as per the Annual Report, prepared in accordance with the accounting policies adopted by the Board.

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## COMMERCIAL VALUE

Section 16(3) of the CRI Act requires the Company to furnish an estimate of the current commercial value of the Crown's investment.

The Board is satisfied that the net asset position (or shareholders' funds) as at 30 June 2023 is a fair and reasonable indication of the commercial value of the Group. The net asset position as shown in accordance with the Company's accounting policies for 30 June 2023 was \$39.4 million.

## DIVIDEND POLICY

The GNS Science dividend policy states that the Company may elect to return surplus cash to shareholders in the form of a dividend when no sound investment opportunities exist (including reinvestment, commercialisation, capital expenditure, and the retention of important capabilities).

GNS Science is investing in people, systems and science infrastructure to enable delivery of its research strategies over the longer term. Therefore, no dividend is proposed in the short to medium term.

## ACTIVITIES WHERE SHAREHOLDER COMPENSATION WOULD BE REQUIRED

No request for compensation is currently being sought from the shareholders. At this time no such investment has been identified, nor have any financial projections for such investment been included in GNS Science's Statement of Corporate Intent 2024-27.



**David Smol**  
Chair  
25<sup>th</sup> July 2024



**Wendy Venter**  
Board Member  
25<sup>th</sup> July 2024

# APPENDIX ONE

## GNS SCIENCE KEY PERFORMANCE INDICATORS

Indicator	Measure Year ending 30 June	Target 2023/24	Target 2024/25
<b>Strategic Intent</b>			
Priority setting	Surveyed end-users have confidence that GNS Science considers their sector's priorities when setting their research priorities (%)	>70%	>70%
Team selection	Surveyed end-users have confidence that GNS Science has assembled 'best' teams for research delivery (%)	>85%	>85%
<b>Science Impact</b>			
Research delivery	Research milestones (critical steps) on track or completed	>87%	>90%
Impact case studies	Impact case studies published	3	3
Knowledge transfer	Surveyed end-users have adopted knowledge from GNS Science in the past three years (%)	>75%	>75%
<b>Science Excellence</b>			
Peer-review	Programme reviews carried out	3	3
Science quality	Impact of scientific publications (weighted citation index)*	3.2	3.2
Research collaboration	Papers co-authored with collaborators	92%	90%
<b>Science Relevance</b>			
End-user collaboration	Revenue per FTE from commercial sources (\$000)	80	95
Technology & knowledge transfer	Commercial reports per scientist FTE	1	1
<b>Financial</b>			
Revenue generation	Revenue per FTE (\$000)	265	240
<b>Embedding Vision Mātauranga</b>			
Māori engagement	Projects with Māori stakeholders embedded in the research	8	10
<b>High Performance Culture</b>			
Health & Safety	Recordable injuries per 200,000 work hours (rolling 12-month average)	<2	<2
Staff engagement**	Percentage of staff engaged in working for GNS Science	≥73%	≥73%

\* Mean 2-year impact factor for SCImago-assessed journals, weighted by the number of GNS Science publications.

\*\* Based on the Qualtrics Survey cluster of questions and definition for staff engagement.

# APPENDIX TWO

## OUR NATIONALLY SIGNIFICANT COLLECTIONS AND DATABASES

We are the custodian of eight Nationally Significant Collections and Databases (NSCD). As well as ensuring that the databases and collections are kept up to date with newly acquired samples and data, we will maintain and improve system functionality and infrastructure to ensure ready access both internally and externally for research, commercial applications, and public information.

- The **Regional Geological Map Archive and Data File (RGMAD)** is a collection of nearly 7,000 published and unpublished geological maps in hardcopy as well as digital image and GIS formats for Aotearoa New Zealand, its offshore territories and Antarctica. The maps range from field sheets to draft compilations to complete maps as published, vary in scale and extent from national to local, and range in emphasis, including general, urban, volcano, resource and tectonic. The collection includes maps dating back to the mid-19<sup>th</sup> century and is regularly added to when new geological maps are completed.

The hardcopy maps are stored in the Historic Geological Map Archive dataset at GNS Science's Lower Hutt building and some of the oldest maps are stored with the National Library. The maps in the archive are available as high resolution, georeferenced scans available for viewing and download via a map image server.

Vector GIS format geological and geomorphological maps, as well as 3D geological models, created since the mid-1990s are part of the Geological Map of New Zealand dataset, stored on GNS Science servers and available through web services and web map applications. These include digital GIS-based national geological maps at 1:1,000,000 (less detailed) and 1:250,000 (more detailed) as well as post-2012 geological map products for Christchurch-eastern Canterbury, Middlemarch, Napier-Hastings, Tongariro National Park, Victoria Range, northeastern Otago and Pukekohe.

- The **National Petrology Reference Collection and Petlab Database.** The National Petrology Reference Collection (NPRC) contains around 93,000 rock and mineral samples collected from Aotearoa New Zealand and its territories dating since the mid-19<sup>th</sup> century. The collection contains representative and less common rock types.

Petlab is Aotearoa New Zealand's national rock, mineral and geoanalytical database. It is operated by GNS Science, with GNS Science plus Auckland, Waikato, Massey, Victoria, Canterbury and Otago universities all contributing data. There are sampling data for all rocks and minerals in the NPRC and information for a further 120,000 or more samples with analytical data extracted from published literature. The database contains information on sample locations, descriptions and geochemical, geochronological and petrophysical analyses for rocks and minerals within the NPRC and from other published information on samples from on- and offshore Aotearoa New Zealand, Antarctica and worldwide.

- The **NZ National Paleontological Collection and Associated Databases (NPC)** contains fossil samples collected from Aotearoa New Zealand and its territories dating since the early 19<sup>th</sup> century. The collections include vertebrate, invertebrate and plant macrofossils, animal and plant microfossils, trace fossils, and fossil bearing rocks or rocks that have been sampled for microfossils. In addition to systematic reference collections of macro- and micro-fossil taxa from Aotearoa New Zealand and surrounding areas, including Antarctica and New Caledonia, the NPC includes a large number of type and figured specimens, as well as some important historical collections and a small amount of foreign reference material. Notably, the NPC also hosts the only International Ocean Discovery Program (IODP) Micropaleontological Reference Centre located in the Southern Hemisphere.

Included in this NSCD are two important databases that are founded in part on paleontological information: the New Zealand Stratigraphic Lexicon and the New Zealand Geological Time Scale. The Stratigraphic Lexicon records usage of stratigraphic nomenclature in Aotearoa New Zealand and is organised hierarchically. The lexicon can be viewed and searched through a web application. The New Zealand Geological Time Scale is the official record of important geological age boundaries and their definitions for the Aotearoa New Zealand region.

- The **NZ Fossil Record File (FRF)** comprises a comprehensive archive of fossil collections made from >110,000 locations around Aotearoa New Zealand and surrounding areas, including Antarctica and New Caledonia, recording detailed locality information, stratigraphic data, age and paleoenvironmental interpretations, and, for many records, taxonomic lists of the fossils collected. The FRF has a digital equivalent Fossil Record Electronic Database (FRED) hosted by GNS Science that enables searches, analysis and downloads of fossil-related data. The New Zealand Fossil Record File is jointly managed by the Geoscience Society of New Zealand and GNS Science.

- The **National Groundwater Monitoring Programme (NGMP)** is a groundwater quality dataset, collected regularly through collaborations with regional council personnel from 110 sites across all 15 regions of Aotearoa New Zealand, since 1990. The network attained national coverage in 1998. Information stored in the NGMP dataset includes groundwater source location, groundwater quality indicators (e.g., major ions, nutrients, dissolved metals), groundwater age tracer measurements (e.g., chlorofluorocarbons, tritium, and sulphur hexafluoride), mean residence time age interpretation at each site and key hydrogeological properties, where available. Samples are collected according to a national, dedicated protocol (published in 1999, updated in 2006, national environmental Monitoring Standards for discrete water quality 2009).

The NGMP assets are preserved and enhanced through dedicated quality assurance procedures, maintaining the viability and longevity of the network, adding new samples and data, undertaking research to enhance the assets, and ensuring that curation facilities are appropriate for long-term protection and availability. The NGMP dataset is stored in the broader Geothermal Groundwater Database (GGWD).

- The **National Earthquake Information Database (EID)** provides raw and derived data related to earthquakes in Aotearoa New Zealand, to the public, government agencies, industry and researchers. The EID includes the Earthquake Catalogue containing information on the epicentre location, depth and magnitude of earthquake occurrences. Acquisition of new data falls to GeoNet through their monitoring network of >190 seismographs and processing of the measured waveforms. The strong motion data product results from a national network of >260 sensors. Other EID datasets include moment tensors, felt reports, the digital waveform archive, seismograph station metadata, the national velocity model and a fault rupture model. Legacy seismograms recorded on paper or film are being scanned and digitised to help extend the record of seismicity further back in time.

- The **NZ Volcano Database** is largely a virtual collection of volcano-related data covering Aotearoa New Zealand's active and dormant volcanoes. Volcano-related images and videos, and data such as seismic, acoustic, geochemistry, ground deformation and geological maps are all stored as part of larger databases, many supported by the GeoNet hazard monitoring network. Volcano-specific datasets include the Eruption History Database.

- The **NZ Geomagnetic Database** enables the acquisition and transfer of critical Southern Hemisphere Earth's magnetic field measurements continuously collected at the Eyrewell (Canterbury), Scott Base (Antarctica), and Apia (Samoa) geomagnetic observatories to the global INTERMAGNET (International Real-time Magnetic Observatory Network) database. Through INTERMAGNET the data are easily accessible and freely available to the public. Scientists around the globe use INTERMAGNET data to improve the understanding of the dynamics within the Earth's core that drive our protective shield and how it changes over time. Geomagnetic storms as potential hazards to power grids and therefore to society are of particular interest for Aotearoa New Zealand.

The database includes paper records of geomagnetic field values collected at Apia in 1908-1994, at Scott Base in 1957-1994, and in Canterbury in 1916-1995 (at Amberly until 1977, at Eyrewell from 1978) and these are being scanned and digitised. Digital records for Eyrewell (EYR), Scott Base (SBA) and Apia (API) geomagnetic observatories are available since 1951 with formats and sampling rates changing over time.



*Forest Lifeforce Restoration Trust Chairman Simon Hall and Ed Chignall finding a section of elamosaur vertebrae in the Mangahouanga Stream post Cyclone Gabrielle 2023*

# DIRECTORY

## PRINCIPAL LOCATION AND REGISTERED OFFICE

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## PHOTO ACKNOWLEDGEMENTS

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### P3

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### P5

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### P7

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Alex Wallace Photography

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Conrad Burton, GNS Science

### P36

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# SCIENCE WORKING FOR AOTEAROA NEW ZEALAND

The Crown Research Institutes (CRIs) proudly work, individually and collectively, to create a more prosperous, sustainable and innovative Aotearoa New Zealand.



**4,400**  
SMART AND  
PASSIONATE PEOPLE

**54**  
SITES ACROSS  
AOTEAROA  
NEW ZEALAND

**6,000**  
SCIENCE PROJECTS  
EACH YEAR

**40**  
NATIONALLY  
SIGNIFICANT DATABASES  
& COLLECTIONS

