



SCIENCE THAT MATTERS

WHERE IT MATTERS MOST

Presented to the House of Representatives
pursuant to the Crown Research Institutes Act 1992.

Our Annual Report is presented in two parts –
Highlights (Part 1) and Performance and Financials
(Part 2). Together, these documents fulfil our
annual reporting responsibilities under the Crown
Research Institutes Act 1992 for the year ended
30 June 2023.

The Performance and Financials (Part 2)
includes performance information, the report
of the directors, financial statements, and
independent auditor's report.

Our Annual Report is also available in digital format
at www.gns.cri.nz

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GNS SCIENCE

OUR VISION

A CLEANER,
SAFER, MORE
PROSPEROUS
AOTEAROA
NEW ZEALAND.

OUR PURPOSE

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.

OUR DIRECTION

Our direction is defined by the research required to enable a cleaner, safer, more prosperous Aotearoa New Zealand. That is, a country more resilient to natural processes, a more sustainable environment, and a better quality of life for all who live here.

Our **Science Roadmap** identifies where we can best deliver benefit through our research for future stakeholders and New Zealanders, and realise our vision.

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

- 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
- enable industry, innovation, infrastructure and economic growth.

GNS Science is genuinely committed to increasing our understanding of Māori science needs and expectations. To support this outcome, we are implementing **Te Punawai o Rangiātea, our Māori Strategy**. 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).

By 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 demonstrate 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.

OUR SCIENCE

Focused on four research themes, our data, discoveries and innovations over the past year are enabling more informed decisions to meet Aotearoa New Zealand's current and future needs.

Our themes are underpinned and connected by Vision Mātauranga, Social Sciences and Data Science. This helps us to make certain our outputs are useful, usable and used, enabling us to deliver impact.

When mapped to the United Nations Sustainable Development Goals, our science direction contributes to the goals set out below:

The tables in this section set out what we achieved this year in delivering the outputs planned in our Statement of Corporate Intent (www.gns.cri.nz/about-us/corporate-documents)





NATURAL HAZARDS AND RISKS

Growing our understanding of natural hazards, building resilience to natural hazard events and improving our ability to manage risk associated with different natural hazards.

GNS Science has a national leadership role in monitoring and researching the causes, risks and consequences of geological hazards in Aotearoa New Zealand. The purpose of our research is to generate important scientific knowledge and tools that can be used to improve resilience to natural hazards at national, regional, business, community and individual

levels. The more we understand about the size, frequency and location of our geophysical hazards and what triggers geohazard events, the better we will be prepared for the future, have more effective responses when they do occur and recover more quickly from them.

The main natural hazards we research are earthquakes, landslides, volcanoes and tsunamis.

What we planned 2022/23	What we achieved and the impact it had
<p>1 Complete the GeoNet Strategic Review.</p>	<p>GeoNet uses networks of sensors to gather scientific data on four geohazards: earthquakes, tsunami, volcanoes and landslides. The data that it captures leads to better understanding and management of Aotearoa New Zealand's geohazards, and plays a vital role in supporting scientists during geohazard events.</p> <p>Emergency managers depend on GeoNet data and would like even more products, services and interpretation from it. As we work with our partners to establish a new funding model, we are considering the future direction of GeoNet's products and services to ensure that it is future-focused and structured to deliver maximum impact for Aotearoa New Zealand.</p> <p>This year we completed a strategic review of GeoNet to highlight the possibilities. The review document can be found on the website here www.gns.cri.nz/assets/Uploads/Our-Science/GeoNet-Strategic-Review-2022_.pdf</p>
<p>2 Complete the revision of the National Seismic Hazard Model (NSHM) and communicate results to key stakeholders.</p>	<p>The National Seismic Hazard Model (NSHM) calculates the likelihood and strength of earthquake shaking that may occur in different parts of the country over specified time periods. This information is used by government and industry to help improve national resilience and manage risks to safety, security and the economy from seismic events.</p> <p>This year we completed a revision of the National Seismic Hazard Model. The revised model estimates the likelihood of future earthquake shaking hazard to have increased throughout most of the country, ranging from almost no change to more than doubling in some areas. To communicate with key stakeholders, numerous webinars and seminars have been held, a website has been setup (nshm.gns.cri.nz), regional specific pamphlets have been created, and the team has been engaging with our many stakeholders.</p> <p>The review of the NSHM was led by GNS Science and funded by the Ministry of Business, Innovation and Employment (MBIE) and Toka Tū Ake EQC. The revised model, including its component-models and outputs, is freely available.</p>
<p>3 Develop a Geohazards Event Response Framework.</p>	<p>The Geohazards Event Response Framework is a tiered response structure used to effectively coordinate response activities within GNS Science. This year, a model was developed for GNS Science using the national coordinated incident management system, and informed by an external review of response arrangements completed during the year. The framework has been approved in principle by our Event Response Steering Group and we are currently implementing the operational changes.</p>

What we planned 2022/23	What we achieved and the impact it had
<p>4 Through CASCADE¹ engage with both GNS Science and external programmes to understand gaps in how science advice on geological hazards is developed and delivered to decision-makers, build links and identify opportunities for improving science advice about natural hazards and risk management.</p>	<p>GNS Science plays a pivotal role in connecting the many parts of the natural hazards risk management system. We developed the CASCADE programme to identify gaps in knowledge and processes, and develop innovative ways of working with decision-makers and communities. This year we engaged with internal and external programmes to understand gaps, build links and identify opportunities; engaged with stakeholders to understand their requirements and work with them to improve the hazard risk management system; worked to ensure we are well-connected to legislative reform processes; and encouraged two-way discourse between GNS Science and government.</p> <p>This work is supporting the delivery of National Disaster Resilience Strategy objectives, connecting natural hazard and risk research across Aotearoa New Zealand to better facilitate the communication of geohazard and risk knowledge and the uptake of this knowledge into preparedness and policy.</p>
<p>5 Engage with Treasury to develop risk and resilience metrics aligned with changes to the Living Standards Framework.</p>	<p>A study on how GNS Science can report on our impacts using the Living Standards Framework was completed this year. In addition, a wellbeing approach to resilience monitoring and evaluation has been applied in the development of the National Seismic Hazard Model Vision Mātauranga Strategy and the Ruawai Adaptation Pathway in the Kaipara District.</p> <p>Natural hazards can have a significant impact on the wellbeing of communities. Aligning our indicators and metrics to the Living Standards Framework will mean we can monitor and report against the broader impact of our work in hazards and resilience.</p>
<p>6 Strengthen capability and capacity to better understand how iwi/Māori have built and maintained resilience and to support iwi/Māori priorities and initiatives for disaster risk reduction.</p>	<p>Some of the key initiatives this year were:</p> <ul style="list-style-type: none"> • Building on previous research, we visited seven schools from Gisborne to Tōrere, collating information from hui with school staff. Topics included tsunami zones, evacuation practice, resources for teachers, planning at home, school response plans, stakeholder involvement, and capability development. Discussions focused on future collaborative work with the schools, iwi and hapū to enhance seismic resilience. • Engaging with Ngāi Tahu on the use of RiskScape™ as a tool through which iwi can engage with disaster risk concepts and understand the iwi's assets to risk exposure. • Linking in with work being conducted with Te Wharekura o Arowhenua, a Kura Kaupapa Māori school in Southland, to explore rangatahi/rakatahi perspectives on climate change in Murihiku/Southland.
<p>7 Engage with government to support a process for the development of risk tolerability/ acceptability frameworks and risk treatment options including clarity on which agencies have accountability for different risks.</p>	<p>GNS Science is working with the National Emergency Management Agency (NEMA), Toka Tū Ake EQC and MBIE to build a multi-hazard risk model and information sharing platform for agencies and researchers involved in Cyclone Gabrielle recovery.</p> <p>This new RiskScape platform will ensure timely access to risk models, providing information for decision makers and giving them the capability to investigate risks. Risks to the community from multiple hazard impacts can be investigated under different scenarios, for example, redevelopment and growth scenarios, climate change scenarios, different land use planning interventions, etc.</p>

1. CASCADE is a programme aimed at delivering improvements in the assessment and communication of geohazard risk, and enhancing the science advice that is provided to risk managers.

What we planned 2022/23**What we achieved and the impact it had**

8 Ensure communication and uptake of physical science is enabled through integration with social science.

Integrating social science expertise in our research helps us to deliver targeted, collaborative research that addresses some of the critical challenges facing communities. The social science perspectives, tools, methods and frameworks allow us to enhance the value of science in our investment to bring positive change in society.

GNS Science has a history of leadership in natural hazards risk management research, which relies on social science insight about risk communication, preparedness and building community resilience. Highlights from this work during the year include:

- Following Tonga's Hunga Tonga–Hunga Ha'apai volcano event, 2,100 people around the country shared their observations of the event with GNS Science through e-mails and an online survey. The tsunami and noise observations reported by people across the country are now helping inform our scientific understanding of the eruption and tsunami and how we can prepare for future events.
- We are working with key partners at the national, regional and local levels to communicate the change in Volcanic Alert Level at Taupō volcano. Close working relationships across government agencies, communities and iwi have allowed GNS Science to navigate a delicate piece of communication that would be prominent in national and international media.
- Developing an impact-based warnings information series that provides accessible guidance to stakeholders about how to develop impact-based warnings. This work is being done as part of the Resilience to Nature's Challenges National Science Challenge (Wildfire programme) to help meet the needs of emergency managers, councils, and other warning providers.
- Research investigating the most effective way of showing tsunami evacuation zones on maps for NEMA and regional civil defence and emergency management (CDEM) groups. The results will inform an update to the Directors Guidelines on evacuation maps facilitated by NEMA.

9 Collaborate closely with others to understand and publish information on the emerging technologies and methodologies resulting from the Hunga Tonga–Hunga Ha'apai eruption.

GNS Science participated in the international survey of Hunga Tonga–Hunga Ha'apai volcano using the unmanned surface vessel (USV) Maxlimer. This work was done in collaboration with SeaBed2030, National Institute of Water and Atmospheric Research (NIWA), Sea-Kit and the United States National Oceanic and Atmospheric Administration (NOAA). The main purpose of the survey was to determine the after-eruption bathymetry of the volcano and to determine if the eruption is ongoing. This was the first time a survey of the water column inside a submarine volcano caldera has been undertaken remotely.

Analysis of this complex eruption has benefited from a multi-disciplinary and collaborative approach, with four main strands:

1. Based on lightning data, the spreading rate of the ash-rich plume has been derived. Plume spreading occurs after the plume has reached its maximum height of around 55km above sea level. Our work in collaboration with MetService Te Ratonga Tiorangi is highlighting an unprecedented spreading rate, which is refining our understanding of this important volcanic process.
 2. Data obtained remotely during the voyage to Hunga volcano is being analysed. Based on deployment of sensors into the water column above the caldera six months after the eruption, it is clear that hydrothermal activity was ongoing, possibly in conjunction with volcanic activity.
 3. Tsunami analysis of the near-source signal is continuing, much of which will be in close connection to geomechanical modelling of caldera subsidence during the eruption. This will tie into the global tsunami analysis.
 4. Social science analysis of crowd-sourced observations of tsunami impacts and booming sounds is complete and a GNS Science report has been published that outlines the spatial distribution of responses and their observations. This will form the basis for a publication comparing observations to instrumented data that includes pressure and acoustic sensors.
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Understanding the drivers of climate and environmental changes and their impact on ice sheets, groundwater, and ecosystems to mitigate warming and adapt to unavoidable sea level rise.

Our research under this theme focuses on the sustainable management of the environment and effective adaptation to climate change.

We must improve our ability to predict how our climate may change and identify its thresholds and tipping points. It will be important 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 frequent and intense.

Science is needed to provide context and to evaluate natural variability and baselines so that we can attribute and address human-driven change. There is little point trying to mitigate climate change driven by natural variability – attribution is key where possible. Our research is vital to our future. What we do now to understand and mitigate the impact we are having on the world’s environment and climate will benefit our communities now and for generations to come.

Measures of Success 2022/23	How did we measure up?
By June 2023, improved climate projections are integrated into national climate change policy and at least one Regional Plan.	NZ SeaRise is a five-year research programme funded by the MBIE Endeavor Fund, led by Te Herenga Waka Victoria University of Wellington, and including researchers from GNS Science. This year the NZ SeaRise projections have been included in an update to the Ministry for the Environment’s Coastal Hazards Guidance for Local Government. This interim guidance outlines updates to parts of the Ministry’s 2017 Coastal Hazards and Climate Change: Guidance for local government to reflect the latest sea-level rise scenarios from the Intergovernmental Panel on Climate Change and NZ SeaRise.
By June 2023, the carbon budgets across our four major urban centres are accurately monitored.	We have made significant progress on monitoring and modelling carbon emissions across Auckland. This insight will be applied across other urban centres if additional resource and support can be acquired. An Endeavour Fund programme that is designed to support this work is currently under consideration.

What we planned 2022/23	What we achieved and the impact it had
<p>1 Establishment of a world-class noble gases analytical machine at the Avalon Water Dating Laboratory, which will significantly enhance our capabilities with regard to understanding, e.g., denitrification, identifying groundwater recharge sources (drinking water standard), geothermal processes, etc.</p>	<p>Over the last two years, GNS Science has developed improved capability to accurately measure the noble gas concentrations needed to calculate excess nitrogen gas (N₂) resulting from denitrification reactions. This development includes a new quadrupole mass spectrometer and new state-of-the-art gas purification system located in our Water Dating Laboratory. This new facility delivers measurements with high analytical precision and accuracy for measuring noble gas concentrations, allowing improved detection of low levels of denitrification in groundwater systems. Ultimately, these excess N₂ measurements can be combined with hydrochemistry and other tracer information (e.g., tritium ages) to better understand the processes governing nitrate load transport in aquifers. This information is used to inform the development of effective land use policies to maintain water quality.</p> <p>The facility is expected to be fully operational by December 2023.</p>
<p>2 A data release procedure is in place and used by the project team for the Groundwater SSIF programme to publicly release SSIF-created datasets.</p>	<p>A data release procedure is available and is being used by the SSIF Groundwater project team. The new published version of the North Island Hydrogeological Units Maps (HUM) datasets was released using the new procedure</p>

What we planned 2022/23**What we achieved and the impact it had**

<p>3 SkyTEM processing, modelling, interpretation and visualisation capability has been developed at GNS Science, resulting in SkyTEM data being used to create three 3D hydrogeological models in Hawke's Bay. Resulting information and models are readily available for public access and guidance has been provided to Hawke's Bay Regional Council for utilisation of these data within numerical groundwater models.</p>	<p>SkyTEM processing and modelling capability has been developed and has enabled the processing and interpretation of the SkyTem surveys that have been completed (Northland, Southland, Wairarapa, Gisborne, offshore volcanic islands and Hawke's Bay). A public access and communication tool has been released, with a focus on communicating the results of the Poukawa and Ōtāne area in Hawke's Bay. storymaps.arcgis.com/stories/ea328f3a17f64daeae58d516d4433511</p> <p>The Ruataniwha groundwater modelling is intended to inform the development of Hawke's Bay Regional Council groundwater management plans.</p>
<p>4 New regional scale models of circum-Antarctic Ocean response to a retreating Antarctic Ice Sheet are completed. Apply advanced AI/Data Science techniques (such as automated classification, deep learning) in our paleoenvironmental research.</p>	<p>New regional scale models of circum-Antarctic Ocean response to a retreating Antarctic Ice Sheet were completed.</p> <p>GNS Science researchers also contributed to a proof-of concept research paper on automated capture techniques. As a result of this work, we have been able to incorporate new image acquisition and classification techniques in Antarctic Science Platform drilling, to interpret fossil marine diatoms and dinoflagellate cysts for age control. This work was done as part of the Sensitivity of the West Antarctic Ice Sheet to 2°C Warming Research Programme. The new techniques have also been used to interpret sub-fossil diatom assemblages from New Zealand lakes as part of our Global Change Through Time (Strategic Science Investment Fund) Programme.</p> <p>Use of these techniques dramatically increases the number of samples that can be examined at the same time, while also allowing new types of insights not feasible with previous manual data collection methods.</p>
<p>5 A full set of sea level projections at 2km spacing around Aotearoa New Zealand's coastline to include Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6) climate data and the local influence of vertical land movement is published online.</p>	<p>NZ SeaRise is a five-year research programme funded by the MBIE Endeavour Fund, led by Te Herenga Waka Victoria University of Wellington, and including researchers from GNS Science. The NZ SeaRise projections have been included in a recent update to the Ministry for the Environment's Coastal Hazards Guidance for Local Government. This interim guidance outlines updates to parts of the Ministry's 2017 Coastal hazards and climate change: Guidance for local government to reflect the latest sea level rise scenarios from the Intergovernmental Panel on Climate Change and NZ SeaRise. environment.govt.nz/publications/interim-guidance-on-the-use-of-new-sea-level-rise-projections</p>
<p>6 Co-designed field-based activities to enhance iwi involvement in Geosciences are completed and lead to a new iwi-led research partnership that aims to investigate climate change impacts on local communities in Northland.</p>	<p>Tūhura Papatūānuku, a marae based GeoCamp, was completed at Waimanoni marae north of Kaitaia. This is the second of two events supported by a contract from Te Rarawa iwi, using Ministry of Education funds, along with co-funding from GNS Science's Global Change through Time programme. Tūhura Papatūānuku Geo Noho aims to enthuse Māori tamariki from rural areas about the possibilities of science prior to them starting high school.</p> <p>Two important elements to achieve this outcome are place: holding the events in a familiar and immersive noho marae setting, and content: focused co-design and co-delivery with Māori knowledge-holders and educators to ensure integration of topical science content with te āo Māori.</p> <p>MBIE funding was granted for an Unlocking Curious Minds project "Tūhura Papatūānuku: a noho-marae based Earth and environmental sciences wānanga" to support two similar events in the coming year. In addition, a MBIE Endeavour Programme "Our changing coast – Sea-level rise on Aotearoa's dynamic margin" was awarded in September 2022. Led by Te Herenga Waka Victoria University of Wellington, it includes GNS Science researchers working with researchers and community leaders from Te Rarawa iwi, who are funded to investigate sea level impacts on local coastal communities in Northland.</p>



Helping transition our national energy ecosystem to a low-carbon, resilient, cost-effective alternative through improved energy generation approaches, storage methods and utilisation models.

Under this theme we deliver research and technology solutions that support a sustainable, low-carbon future for Aotearoa New Zealand.

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.

This will be achieved through increased use of geothermal energy for electricity generation, direct use of geothermal energy, improvements in hydrogen production, the development of enabling technology to increase the use of renewable energy, and the identification of new energy sources that contribute to a low-emissions energy future.

Measure of Success 2022/23	How did we measure up?
By June 2023, new geoscience data and modelling of low enthalpy geothermal systems are being used to unlock greater direct use of geothermal energy.	<p>New aquifer energy potential maps are being developed. Initial maps have been used in discussions with Vegetables New Zealand and the Ministry for Primary Industries (MPI) who are looking for alternative fuels for greenhouse heating options as growers are decarbonising their practices. Heat flow maps and models have also been developed and are being used to target further investigations into the direct heat use and the potential for local small scale electricity generation.</p> <p>Current geological and geophysical information is also being used as the basis of an energy availability review for the Energy Efficiency and Conservation Authority (EECA). This work forms part of the review of available renewable energy resources in different areas, with the aim that if the data is readily available, people and business will consider the uptake of smart renewable energy use, including direct geothermal.</p>

What we planned 2022/23	What we achieved and the impact it had
<p>1 Maps of low-temperature geothermal resources are developed through new models of heat flow, subsurface temperatures, thermal rock properties and curie point depths for Aotearoa New Zealand's land mass.</p>	<p>Knowledge of the crustal temperature is important in managing the expansion of geothermal energy use, including lower temperature direct use. Despite Aotearoa New Zealand's long history of developing geothermal resources, crustal temperature distribution across much of the country is incomplete. To remedy this, we are developing a national temperature map using a 1D transient heat flow model in regions where this is relevant. To support the model, we have established thermal properties measurement capability, which is being used in conjunction with geochemical and mineralogical data, to estimate thermal properties. This work is continuing into the 2023/24 year.</p>
<p>2 New understandings of the impacts of reinjection of CO₂ on high-enthalpy geothermal reservoir dynamics and power station infrastructure.</p>	<p>We have been simulating brine re-injection in a number of geothermal scenarios, with experiments conducted using greywacke and acid-dosed brine. The results indicate that re-injection of carbon dioxide could provide positive benefits for the maintenance of formation injectability, particularly when the formation contains significant calcite. These findings have significant implications in the understanding and management of geothermal reservoirs in the future.</p>
<p>3 A method will be developed using curie point and heatflow analysis of Te Riu a Māui Zealandia to assess geothermal prospectivity.</p>	<p>Understanding where the heat gradient of Aotearoa New Zealand's crust is higher than normal is essential to identifying regions where geothermal energy could be developed, in particular outside of volcanic areas. As part of our 'Geothermal: the next generation' Endeavour programme, the team has been using the magnetic signature of the crust to model the heat flux. The initial 1D conductive heat flow models using curie point as input have been run and a manuscript showing the modelled heat map has been completed.</p>

What we planned 2022/23	What we achieved and the impact it had
<p>4 A new prototype model of the electricity system in Aotearoa New Zealand will be developed.</p>	<p>Aotearoa New Zealand's energy system will undergo a radical transformation as the country moves to a net-zero carbon future. There are many different views about the form that this transformation will take, with little agreement between groups. Energy systems are complex and there is a need for reliable independent models that can be used for forecasting. GNS Science has identified energy systems modelling as an area of research focus for the next 5-10 years. The first step is to build a model of the country's electricity system. Energy modelling software has been chosen and example problems have been run. This work is expected to be completed in the 2023/24 year.</p>
<p>5 GNS Science will organise and contribute to a workshop focused on implementing direct heat infrastructure in Taupō that will demonstrate the value of geothermal energy to the Taupō public, government and developers.</p>	<p>A workshop was hosted which discussed global trends in ground source heat pumps (GSHP) and district heating. The work was of interest to a wide range of groups, with attendees including developers from both Taupō and other parts of the country, representatives from aged care facilities, the Climate Change Commission, non-governmental organisations, drillers, engineers and others.</p> <p>Another workshop is being organised for 2023 at Geothermal Week focusing on geothermal direct use in the horticulture industry.</p>
<p>6 An electrocatalytic testing facility is developed for researchers and industries to test materials for hydrogen production.</p>	<p>The hydrogen electrocatalytic testing laboratory has been installed at our National Isotope Centre at Gracefield and is being used for research and development.</p>
<p>7 Integrated capability will be developed in the field of thermal materials and engineering that will enable research and industry consultancy to improve energy efficiency and renewable energy utilisation.</p>	<p>A commercial research and development contract between GNS Science and Fisher & Paykel Appliances (FPA) is underway. The first stage of work includes experimental research which will build on capability developed in energy efficiency and thermoelectric materials under our Strategic Science Investment Fund programme in recent years. The programme will also result in new unique thermal measurement equipment in Aotearoa New Zealand. See our 'Innovating better materials together' story in Part 1 of this Annual Report.</p> <p>The research is being supported by an undergraduate (summer student) project through our partnership with Te Herenga Waka Victoria University of Wellington.</p>



Building the fundamental understanding and revealing the processes that continue to shape Te Riu-a-Māui Zealandia and impact our wider society and economy.

This theme generates knowledge about our continent and oceans that enables us to improve predictive capability for hazards and disasters, understand global scale environmental change, variability and impacts, and identify new sustainable natural resources. Under this theme, GNS Science is the pre-eminent kaitiaki (steward and custodian) of Earth science knowledge, mātauranga, and databases and collections taonga.

Our research under this theme is framed in health, cultural, economic and environmental outcomes and is underpinned by the precious taonga in our Nationally Significant Collections and Databases.

Measure of Success 2022/23	How did we measure up?
By June 2023, the justification for GeoNet expansion will be supported by well posed science questions and validated by numerical models.	An in-depth analysis on optimal site locations to provide maximum information along the Alpine Fault has also been completed, as well as a summary report that provides a clear picture of community priorities. In addition to providing sets of site locations, a final report will summarise the optimisation techniques, as well as describing additional techniques that could be used for future work. Refer No.2 below.
What we planned 2022/23	What we achieved and the impact it had
<p>1 Develop more accurate models of the earthquake history, rates of modern deformation and state of stress of the plate boundary zone to provide better constraints for earthquake and tsunami risk assessment.</p>	<p>Earthquake History:</p> <ul style="list-style-type: none"> This year we have acquired paleo-seismology data from trenches across the Papatea Fault, Marlborough and paleo-tsunami data from coring in the Wairau Lagoon. We have also published new studies of marine terraces in southern Hawke’s Bay and Cape Palliser and further developed novel capability in using biomarkers to date past earthquake ruptures. These projects are important in advancing our understanding of earthquake history. <p>Modern Deformation:</p> <ul style="list-style-type: none"> Pressure, temperature, and hydrological data from the north Hikurangi margin have been analysed to investigate relationships between slow motion earthquakes and damaging seismic earthquakes and tsunami. We also monitored three simultaneous slow slip events on the Hikurangi subduction zone between January and May. <p>State of Stress Knowledge at the Plate Boundary:</p> <ul style="list-style-type: none"> This year analyses of micro-seismicity and stress at either end of the Alpine Fault, and new models of electrical resistivity across the north Hikurangi margin have increased our understanding of the state of stress. Our knowledge of plate boundary structure has also been enhanced by capability developed in Full-Waveform Seismic Imaging and through analyses of 3D Seismic Data along the north Hikurangi margin. This has revealed that geological processes may make seamount collision zones more conducive to producing slow-slip events than damaging earthquakes.
<p>2 Develop methods for informing the expansion of the next generation of GeoNet land and marine seismic and geodesy instrument arrays to enable more reliable forecasts and warning of natural hazards.</p>	<p>An in-depth analysis on optimal site locations to provide maximum information along the Alpine Fault has been completed, as well as a summary report that provides a clear picture of community priorities. The aim is to enable more reliable forecasts and warning of natural hazards.</p>

What we planned 2022/23	What we achieved and the impact it had
<p>3 Contribute to an Earth science understanding of the Hunga Tonga–Hunga Ha’apai eruption to inform future tsunamigenic volcanic eruptions in Aotearoa New Zealand and the South West Pacific.</p>	<p>Six months after the eruption, an unoccupied surface vehicle (USV) survey over the caldera found clear signals of continued hydrothermal and possible volcanic activity. This means that the volcano was still actively discharging fluids and gas. Following most large eruptions, highly restricted access to the volcano reduces the chances of collecting post-eruption data so this dataset is globally unique. Much of the work to analyse the eruption is complete, with four main strands – hydrothermal plume distribution, ongoing hydrothermal activity, tsunami analysis and social science analysis of tsunami impacts.</p>
<p>4 Constrain the links between tectonism, volcanism and geothermal systems in Aotearoa New Zealand to enhance geothermal resource potential and management.</p>	<p>This year we led a special issue of the <i>Journal of Volcanology and Geothermal Research</i>, in which 14 papers were published on aspects of the volcanic, tectonic and geothermal processes occurring in the Okataina Volcanic Centre (OVC) www.sciencedirect.com/journal/journal-of-volcanology-and-geothermal-research/special-issue/105QWX7GFS9. Results were also communicated to the geoscience community at a special session held during the annual Geoscience Society of New Zealand conference.</p> <p>This research has already led to the creation of the first conceptual model of the OVC by the Geohazards Volcano Monitoring Group at GNS Science. Aspects of the research have also led to meetings with the Bay of Plenty Regional Council, iwi and the geothermal industry to discuss implications for the sustainable management of geothermal fields in this region (e.g. Taheke).</p>
<p>5 Be kaitiaki of Te Riu-a-Māui Zealandia by improving understanding of the fundamental processes that formed the continent and controlled its evolution through time.</p>	<p>New observations from northern Zealandia have been documented in a recently published paper which presents how one of the largest subduction zones on Earth, the Tonga-Kermadec system, started. Several new papers have been produced detailing the results of the international VESPA cruise on R/V <i>l’Atalante</i> sampling northern Zealandia and providing insights into the timing of volcanism and tectonic evolution of the portion of eastern Zealandia between Aotearoa New Zealand and New Caledonia.</p>
<p>6 Ensure GNS Science’s high-value geoscience databases are increasingly interconnected and interoperable, resulting in a significant upsurge in their use in data science applications.</p>	<p>An assessment of quality of GNS Science datasets was undertaken this year based on the criteria proposed by the National Environmental Data Centre around terms of use, accessibility, common format, data quality statement, data lineage statement and governance. Improvements in data structures and their interoperability is being achieved through greater use of Amazon Web Services Open Data platforms, currently GeoNet (seismic waveforms, strong motion, global navigation satellite system (GNSS), tide gauge, volcano images, tsunami monitoring) with geological map data still in the pipeline and the potential to add other Nationally Significant Collections and Databases material.</p>
<p>7 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.</p>	<p>GNS Science works closely with a range of international organisations. A particular highlight this year was the signing of a Memorandum of Cooperation between GNS Science and Japan’s National Research Institute for Earth Science and Disaster Resilience (NIED). GNS Science has had a long relationship with NIED, thanks to a strong legacy of researcher-to-researcher interactions. Our two organisations meet regularly on disaster risk reduction topics, and this Memorandum ties together our various collaborations into a strong, enduring relationship.</p> <p>We continue our involvement in the Integrated Ocean Drilling Program (IODP) and International Continental Scientific Drilling Program (ICDP), including attending (virtually) the IODP Forum held in Vienna. The Forum is a place for all the leaders of contributing countries to discuss the issues and management of global ocean scientific drilling platforms and archives. Our Australian partners in the Australian-NZ IODP Consortium have successfully secured Linkage Infrastructure, Equipment and Facilities 2023 funding from the Australian Government, for an additional two years. This grant will continue to support our collective membership in IODP.</p>

PERFORMANCE INDICATORS

For the year ended 30 June 2023

The GNS Science suite of performance indicators includes measures that are consistent across the Crown Research Institutes, as well as indicators that allow GNS Science to show performance against our own strategic direction. This year, GNS Science has performed well against many of our indicators. The results show that we have further work to do with our stakeholders to understand and respond to their expectations, and to better communicate the impact of our work on Aotearoa New Zealand's prosperity and wellbeing.

Further breakdown of the papers co-authored result shows that the percentage of co-authored papers for journals and book chapters was higher than co-authored conference papers. Overall, the level of collaboration increased during the year, with 95% of all publications in quarter four being co-authored.

Over the past few years, GNS Science has moved away from small client projects, and we now target larger, multiyear commercial projects that have a more complex nature and a greater impact.

These projects involve a limited number of high impact outputs (commercial reports) rather than numerous low impact reports. This shift in strategy means that the number of commercial reports generated has decreased.

All teams within GNS Science are focusing on developing action plans aimed at improving employee engagement. Decreases in the engagement score were related to change processes, communication and meaningful feedback, and managers are focusing on these areas as teams develop their action plans.

NON-FINANCIAL INDICATORS



OUR PEOPLE AT A GLANCE

TOTAL HEADCOUNT

507

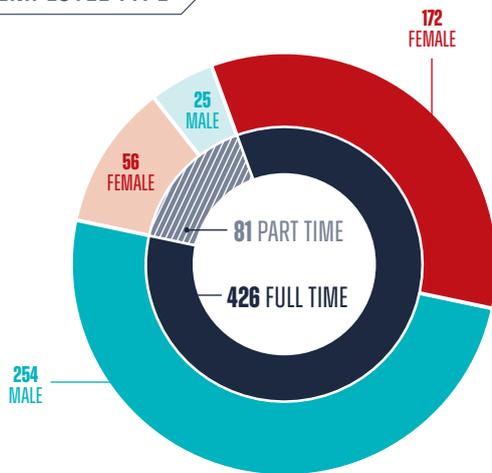
FEMALE

228

MALE

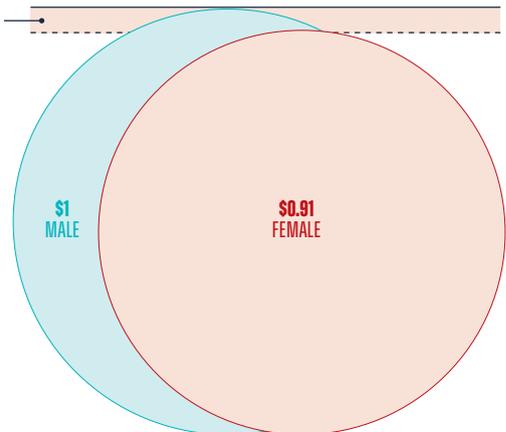
279

EMPLOYEE TYPE

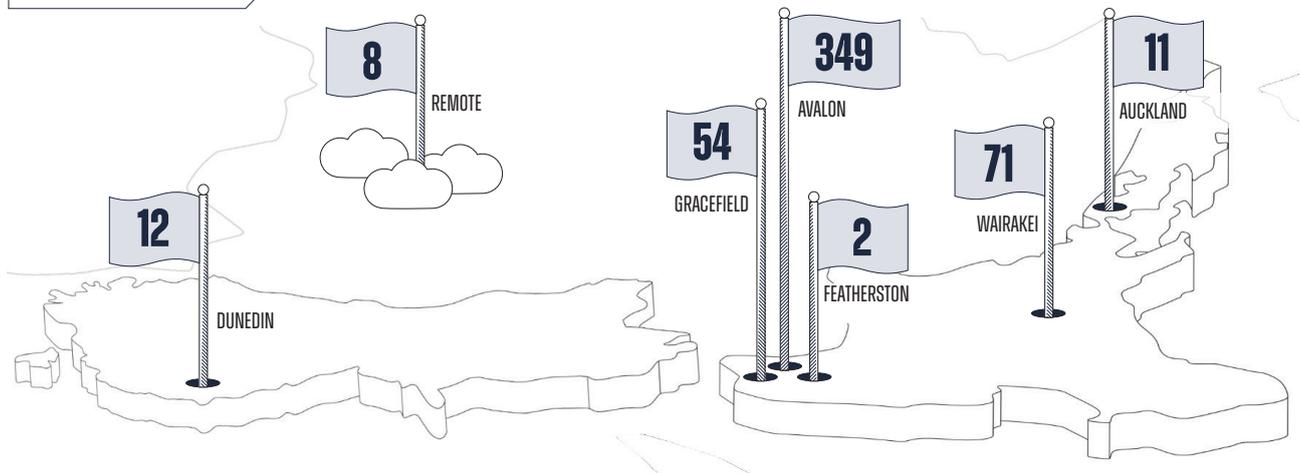


PAY GAP

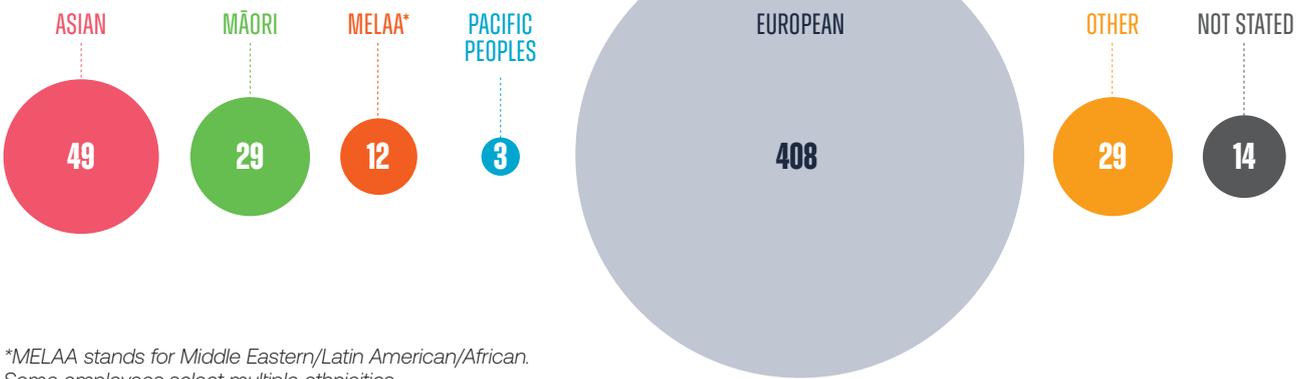
THE AVERAGE GENDER PAY GAP IS 8.52%



WHERE WE WORK

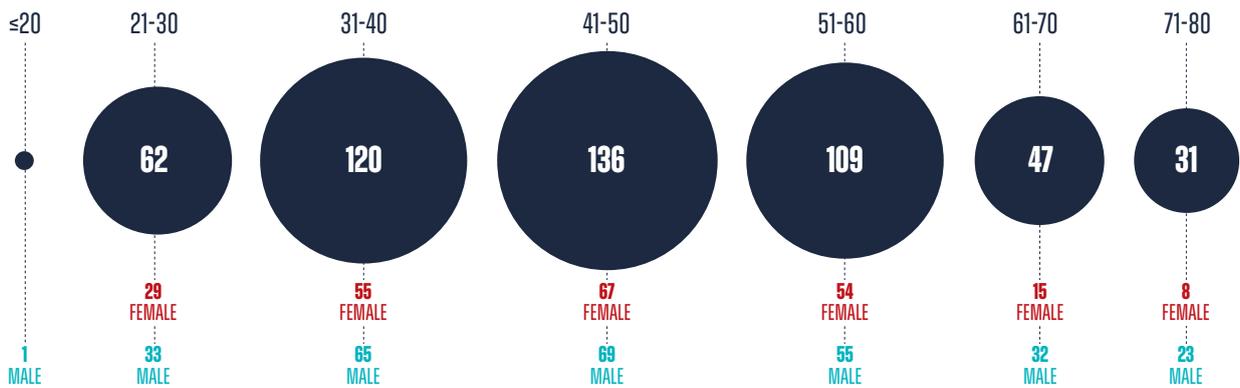


ETHNICITY

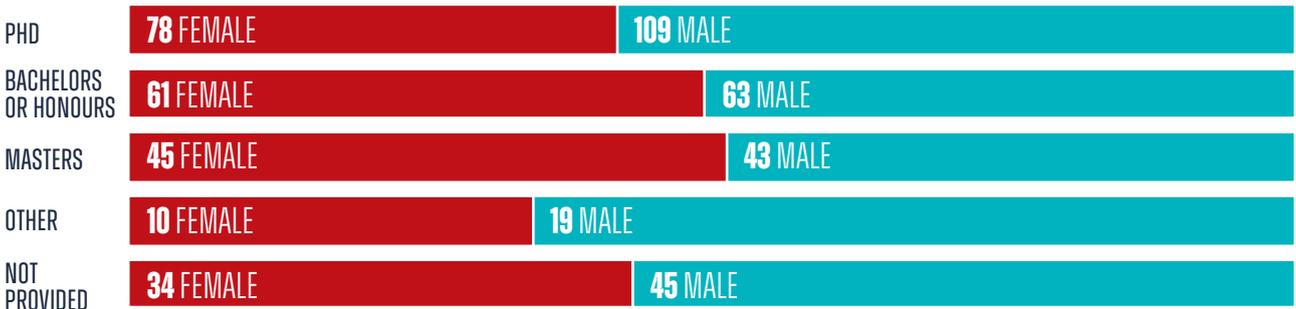


*MELAA stands for Middle Eastern/Latin American/African. Some employees select multiple ethnicities.

AGE RANGE



HIGHEST QUALIFICATION



INVESTING IN OUR PEOPLE

Our people are at the heart of GNS Science's success. They are central to our mission of delivering a Cleaner, Safer and More Prosperous Aotearoa New Zealand.

GNS Science continues to focus on developing our workforce in order to meet our strategic goals and deliver value to Aotearoa New Zealand. Our investment in people and our commitment to being a good employer is evidenced through our focus on leadership development, strategic workforce planning and capability, and diversity and inclusion. These initiatives are aimed at nurturing talent and ensuring our people feel valued for their work.

DEVELOPING OUR LEADERS

We continue to invest in building the capability of our leaders in order to have a positive impact on the organisation's success. Our focus is on increasing leadership skills of all staff, with the main vehicle being the *Tūhono* Leadership Development Programme. This programme began in 2021 and is being rolled out across GNS Science. This year seven cohorts, representing 70 people, completed the programme. By the end of the year, over 25% of our people had completed this programme.

We launched a Management Essentials programme, which focuses on improving core people leadership skills through an in-house programme that traverses a range of topics relevant to our people leaders. An organisation-wide mentoring programme has also recently been launched. It aims to support a wide variety of mentoring types, including those informal relationships already active in the organisation.

DIVERSITY AND INCLUSION

We reviewed our comprehensive Workforce Diversity and Inclusion policy this year. Fostering diversity within our workforce benefits all areas of our work – from the development and delivery of science through to the way we work with our client-base and communities. This is reflected in our ethos of *manaakitanga*: it is through connecting with, being inspired by, and empowering each other that we realise our own potential and this enables us to partner effectively with a wide range of people and communities. This policy is supported by online resources, and unconscious bias training for staff.

Our Equity Diversity and Inclusion Committee is finalising their terms of reference and working on an action plan. And we are working to continue closing the gender, Māori, Pacific and ethnic pay gaps through our *Kia Toipoto* working group.

Our support for Māori participation in science has progressed well with the continuation of the Ahunuku Māori Summer Scholarships programme, as well as our internship programme. We have also continued our ongoing *Te Reo*, *Tikanga* and *Te Tiriti o Waitangi* training programmes. We maintain our Māori Engagement database and intranet toolkit, so information about all our relationships as well as maps and advice are current and accessible to staff to support engagement with Māori and iwi.

As with other CRIs, GNS Science has traditionally had much greater numbers of men in senior scientist roles than women. This has impacted both our gender pay gap and development opportunities for employees. This year we completed the GNS Science Career and Capability Framework. It brings together all of our roles to provide an overview of the career paths and job families available so that everyone has choice and flexibility when it comes to building their career with us. This Framework, and the associated performance and promotion processes, have been developed under a diversity and inclusion lens. This has enabled us to identify those unintentional but systemic issues that create disadvantage within organisations. To date, we have overhauled the way we assess promotion, and we have seen more women moving into senior scientist roles. We are implementing further changes to remove systemic barriers to career development for research and laboratory technicians, giving them the same level of career development opportunities as scientists.

ENGAGING OUR PEOPLE

We conducted two staff engagement surveys this year, a 'pulse' survey in September 2022 and a full survey in April 2023. Participation in the engagement survey was extremely high with an 88% completion rate. The overall result of 68% is down on the score from the same time last year (71%) but higher than the 'pulse' survey score (67%). The most positive increases in score were in the employee and manager relationship, pay linked to performance and everyone can succeed no matter who they are responses. Most of the decreases in score were directly related to changes affecting work, open honest communication, and meaningful feedback. These are high priorities for the leadership team, and several key projects are underway to improve engagement in these areas of concern for staff.

KEEPING PEOPLE SAFE

Our staff conducted more than 1350 field trips in the past year across a range of risks. This includes work on volcanoes and in geothermal areas, in alpine and bush areas, and in and around water both on the New Zealand mainland and offshore. Sometimes it involves extensive off-road driving and working with helicopters. The broad scope of our mission also means that we occasionally had staff in Antarctica and on Raoul Island. In addition, we undertake a significant amount of lab work with all the attendant risks and protocols that this involves.

Keeping our people safe is a key priority. To support this, we continue to expand our health and safety capability and strengthen our collaborative culture that promotes health and safety as part of everyday work. We strive for a workplace that is free of psychosocial stressors such as fatigue and workplace bullying. We regularly discuss best practice risk management with other CRIs and relevant agencies that face similar hazards to ours, as part of a continual improvement process.

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

Demand for health and safety support is increasing, confirming a growing integration of Health and Safety into our day-to-day work. We are confident we have made good progress in developing a more inclusive and responsible culture in support of our Health and Safety vision "Health and Safety is at our core, empowering everyone, every day, everywhere".

For information see our stories in Part 1 on Early Career Staff Network connecting sector-wide, Embedding new systems to support our science, and Ensuring a career pipeline for Māori scientists.

CORPORATE GOVERNANCE

OVERVIEW

The Board is committed to ensuring that the Company and its subsidiaries maintain the highest standards of corporate governance, ethics, corporate behaviour and accountability. The basis for these is set out in the Board's Charter and in the policies and procedures established and maintained by the Company.

ROLE OF THE BOARD AND MANAGEMENT

The Board is responsible to the shareholding Ministers (the Minister of Finance and the Minister of Research, Science and Innovation who is also the Responsible Minister) for governing, directing and controlling the activities of the Company. This includes:

- setting the Company's strategic direction and agreeing the goals in line with the Statement of Core Purpose and annual Statement of Corporate Intent
- overseeing the GNS Science operation and monitoring management performance against plans to ensure GNS Science is achieving the agreed goals
- ensuring there is an appropriate policy framework and approving key policies
- setting GNS Science's risk tolerance and ensuring that effective risk management and regulatory compliance policies and procedures are in place
- setting the direction for health and safety management and ensuring that it is achieved.

The Board delegates management of the day-to-day affairs and responsibilities of the Company to the Chief Executive. The Chief Executive leads the Executive Leadership Team whose role is to implement the strategies and plans for achieving the Company's objectives. A formal Delegated and Financial Authorities Policy sets the operational and expenditure delegations within which the Chief Executive and the Executive Leadership Team operate.

APPOINTMENT OF DIRECTORS AND COMPOSITION OF THE BOARD

Under the Company's Constitution, the Board can comprise up to nine non-executive Directors. The Directors, Chairman and Deputy Chairman are appointed by Cabinet on the recommendation of the Responsible Minister. The term is generally for three years with reappointment for further terms at the discretion of the shareholders. The GNS Science Board consisted of six Directors until 1 June 2023. The Chair of the Board retired and a new Chair was appointed on 1 May 2023. Two new Board members were appointed on 1 June 2023.

The Board considers that it has an appropriate mix of skills, experience and independence to ensure that the Company is governed in a manner that guarantees the interests of shareholders are represented and protected.

On appointment, Directors receive guidelines on the shareholders' expectations, which are in addition to the requirements of the Companies Act 1993. They have access to on-line resources that contain key information and documents about the Company, its subsidiaries and their operations. New Directors also have the benefit of an induction programme to provide them with an understanding of the Company's business and the markets in which it operates.

Each Director has the right, with the prior approval of the Board, to seek independent legal and other professional advice at the Company's expense concerning any aspect of the Company's operations or undertakings to assist in fulfilling their duties and responsibilities as Directors.

DIRECTORS' MEETINGS

There were 14 formal Board meetings during the year ended 30 June 2023. Three of those meetings were special meetings of the Board. One of those meetings was to discuss the prosecution of the Company under the Health and Safety at Work Act 2015 in relation to the Whakaari/White Island eruption. One special meeting was held with two Directors delegated by the Board to approve GNS Science's safety management plan to return to Whakaari/White Island to restore monitoring equipment. One special meeting was held to discuss the Annual Financial Statements and Annual Report.

There was a programme of site visits and presentations to the Board by the Executive Leadership Team, management and science staff, and regular interaction with key stakeholders which enabled Directors to keep abreast of aspects of the Company's activities.

	Board Meetings		Audit and Risk Committee		People and Culture Committee		Health, Safety and Environment Committee		Science Committee	
	No.	No. attended	No.	No. attended	No.	No. attended	No.	No. attended	No.	No. attended
Nicola Crauford	11 ^{ab}	11	5	4	6	5	3	2	3	2
Paul White	14 ^b	12	-	-	6	6	3	3	-	-
John Sharpe	13	12	5	4	-	-	-	-	3	3
Felicity Evans	13	13	-	-	6	5	-	-	3	3
Andrew Cordner	13	13	5	5	-	-	3	2	-	-
Wendy Venter	13	11	5	5	-	-	-	-	-	-
David Smol	2 ^a	1	1 ^a	1	-	-	-	-	1 ^a	1
Livia Esterhazy	1 ^a	1	-	-	-	-	-	-	-	-
Brian Young	1 ^a	-	-	-	-	-	1 ^a	1	1 ^a	1

^a Shows the number of meetings held during term appointed.

^b Additional meeting attended as Board delegate to approve GNS Science's safety management plan to return to Whakaari/White Island.

OPERATION OF THE BOARD

The Board operates in accordance with the Board Charter. It had four standing committees operating during the year – the Audit and Risk Committee, the People and Culture Committee, the Health, Safety and Environment Committee, and the Science Committee. All committees operate in accordance with Terms of Reference approved by the Board. Each committee establishes annual work plans and undertakes an annual review of its Terms of Reference and performance. The table above shows Director attendance at Board meetings and committee member attendance at committee meetings. In addition, any Director may attend any committee meeting.

Matters discussed by the committees were reported back to the subsequent Board meeting and key items were discussed and resolved by the full Board.

BOARD EVALUATION

During the year the Board undertook an evaluation of its performance facilitated by the Institute of Directors.

AUDIT AND RISK COMMITTEE

The Audit and Risk Committee supports the Board in fulfilling its responsibilities in relation to financial reporting, external audit, risk management, legislative compliance and internal audit.

PEOPLE AND CULTURE COMMITTEE

The People and Culture Committee supports the Board in fulfilling its responsibilities in relation to remuneration policy and organisational culture, and the recruitment, remuneration and performance of the Chief Executive and senior leadership.

HEALTH, SAFETY AND ENVIRONMENT COMMITTEE

This Committee supports the Board in fulfilling its responsibilities relating to health, safety and environment matters. The committee reviews and recommends to the Board targets for health, safety and environment performance, assesses performance against those targets, assures that the Company has adequate resources to operate the business safely and reviews serious incidents and audit results, evaluating responses and being satisfied with the adequacy of management actions.

SCIENCE COMMITTEE

The Science Committee supports the Board in fulfilling its responsibilities on the direction and effectiveness of research activities undertaken by the Company. One meeting was held during the year in conjunction with a meeting of the Strategic Scientific and User Advisory Panel (SSUAP), which is a standing advisory panel to the Board.

STRATEGIC SCIENTIFIC AND USER ADVISORY PANEL

The Board receives advice from the Strategic Scientific and User Advisory Panel. The purpose of the Panel is to ensure our science continues to have a focus on excellence and that we are well tuned in to national and international trends and associated opportunities. Panel members have broad experience and insight across all our science themes and provide strong end-user perspectives. Profiles of the Panel members can be found on page 26 of this Annual Report.

INTERNAL AUDIT AND RISK MANAGEMENT

The GNS Science internal audit plan is developed by the Risk and Assurance Manager and outsourced Internal Auditor (KPMG) in consultation with the Audit and Risk Committee and approved by the Board. Quarterly reporting on progress with the internal audit plan, and progress with internal and external audit recommendations are presented to the Audit and Risk Committee. The Internal Auditor has access to management and the right to seek information and explanation. The Audit and Risk Committee meets quarterly with the Internal Auditor without management present.

GNS Science has an established framework for managing risk to inform strategic and business planning processes, optimise allocation of resources and allow the Company to effectively recognise, prioritise and respond to risks. Risks are monitored and assessed and reported quarterly to the Audit and Risk Committee and the Board.

EXTERNAL AUDITORS

GNS Science is committed to ensuring that the external audit provider is able to carry out its functions independently. Our Auditor Independence Policy sets out the framework under which we ensure the independence of the external auditor is maintained at all times both in fact and appearance, such that the audit opinion is highly reliable and credible. The Office of the Auditor-General appointed Deloitte to perform the statutory audit during the year ended 30 June 2023. Deloitte personnel attended three Audit and Risk Committee meetings during the year.

The external auditor may provide non-audit services where these are approved in advance by the Board as being appropriate. No such services were provided by the external auditor for the year to 30 June 2023.

CONFLICTS OF INTEREST

All Directors are required to disclose any conflicts of interest or if they have an interest in any transaction, in which case they may not be entitled to partake in discussions (at Board's discretion) and will not be entitled to vote in relation to the transaction. To facilitate the disclosure of interests and identification of any actual or perceived conflicts of interest, the Company's Disclosure of Interests Register is reviewed and updated at the start of each Board meeting.

PROVISION OF PROFESSIONAL SERVICES

Except in exceptional circumstances, Directors will not provide professional services to the Company and will only do so with the prior approval of the Responsible Minister. This is to avoid a conflict of interest – actual or perceived. No such services were provided by Directors during the year.

OUR BOARD OF DIRECTORS



DAVID SMOL CHAIR

David brings a wealth of experience to the GNS Science Board. He has spent the past 35 years working with businesses and governments to deliver commercial and social projects, including housing, urban and economic development, tourism, science system management, natural hazards and resilience, and resource management reform.

David has a deep understanding of the science ecosystem in New Zealand and has served as Chair of the GeoNet Advisory Panel. He was appointed as the inaugural Chief Executive of the Ministry of Business, Innovation and Employment, where he was responsible for the stewardship of multiple regulatory systems. He is also a stalwart of the energy sector, both here and in the UK, where he has contributed to the development of its infrastructure, regulation, and sustainability. David is a Director of Contact Energy, Waka Kotahi, and the Cooperative Bank, and Chair of Wellington UniVentures – the commercialisation subsidiary of Te Herenga Waka Victoria University of Wellington. He was made a Companion of the Queen's Service Order in 2018.



DR JOHN SHARPE BSc, MSc (Tech), PhD, CMIInstD

John has held a number of executive leadership and director roles in early-to-mid-stage technology companies in Aotearoa New Zealand and the USA.

Trained in the physical sciences, he has spent much of his career developing and commercialising biomedical equipment and other sensor technologies with applications in primary industries, life sciences research, and human health.

He has also been involved in state-owned and industry research organisations carrying out science and undertaking business development activities.



PAUL WHITE B Arch, MBS

Paul is from the Ngāi Tūpoto hapū of Te Rarawa iwi and has had a 30-year background in Māori development and governance, and wide experience in the public service. He is currently a management and development consultant and professional director and lives in Rawene in the Far North.

Over the past 20 years, Paul has served on the boards of Housing New Zealand, Canterbury District Health Board, FITEC, Health Sponsorship Council, Top Energy and the asset holding group of Te Rarawa iwi. He is currently on the Executive of Te Matapiri – a national Māori housing body, and Heritage NZ's Council.

Previously Paul was the Chief Executive of Ngāi Tahu Development Corporation, Regional Director for Te Puni Kōkiri in Te Tai Tokerau, and Regional Manager for the Housing Corporation in Northland.



FELICITY EVANS

Graduate of the Australian Institute of Company Directors (GAICD)

Felicity has more than 25 years' experience in the finance industry, including in retail and commercial banking and human resources.

She was formerly the General Manager Talent and Culture for ANZ New Zealand and Pacific. She is a graduate of the Australian Institute of Company Directors, a Chartered member of NZ Institute of Directors, an Associate of the Bankers' Institute of New Zealand, a former Trustee of Diversity Works, and a former Director of Global Women NZ.



ANDREW CORDNER

LL.B (Hons); LL.M; B.Com

Andrew is Director of Legal at Fonterra. In this role, Andrew serves as Fonterra's General Counsel and leads the highly experienced Fonterra Global Legal Team, with lawyers based in New Zealand, Australia, China, Chile, the Netherlands, the United States, and Brazil.

Andrew also serves as Company Secretary to the NZX-listed Fonterra Shareholders' Fund (NZX:FSF).

Prior to joining Fonterra in 2007, Andrew was a partner at Foley Hoag LLP, a leading US corporate law firm, specialising in corporate and commercial advisory work, venture capital, bankruptcy, intellectual property, mergers and acquisitions, securities law, and international transactions.



WENDY VENTER

FCA, MInstD

Wendy is a board director and independent consultant with expertise in governance, risk management, organisational change and assurance. She is a former partner at EY, Deputy Chief Executive at the Ministry of Social Development and Assistant Auditor General.

Wendy is a director of Plant and Food Research and a trustee of Wellington's Nikau Foundation. She is an independent member of the Treasury's Audit Committee for the Government Financial Statements, and she chairs the risk and assurance committees of Stats NZ and the Parliamentary Counsel Office.

Wendy is a Fellow of Chartered Accountants Australia and New Zealand.



LIVIA ESTERHAZY

Livia has been a strategic business leader for much of her career across various sectors. She spent many years working in marketing, communications and advertising, including in agencies such as Clemenger BBDO, The Assignment Group, Saatchi & Saatchi, and Ogilvy. She has led brands including Kiwibank and Commonwealth Bank of Australia.

Livia has experience working in and around science, including five and a half years as CEO of WWF New Zealand. She is now the Programme Director of A Lighter Touch, a programme working directly with New Zealand food growers to enable sustainable practices, and founder of The Thrive Collective, a nutritional science-driven, health and wellness coaching business.



BRIAN YOUNG

Brian is a neuroscientist, with extensive experience in science leadership and diplomacy. Brian began his career with a BSc (Hons) degree in psychology at the University of Canterbury, followed by PhD study in behavioural neuroscience at Dartmouth College (USA). He held subsequent research positions in the USA, at UNC-Chapel Hill and SUNY-Stony Brook, and in New Zealand.

Brian held a diplomatic posting as the inaugural Science & Technology Counsellor in the New Zealand Embassy (Washington DC). Following this he was Director, Research at the University of Otago, and the Director of the Defence Technology Agency. He is currently the Chief Executive of International Accreditation New Zealand (IANZ).

OUR EXECUTIVE TEAM



CHELYDRA PERCY CHIEF EXECUTIVE

BA, LL.B, Victoria University of Wellington

Chelydra joined GNS Science in May 2023, after nine years as Group Chief Executive of the Building Research Association of New Zealand (BRANZ). In that role, Chelydra oversaw both divisions of the organisation – BRANZ Inc and BRANZ Limited – as well as the subsidiary of BRANZ, which operates out of Australia. She led a team of more than 130 people, including 12 direct reports.

Chelydra's career has seen her work with a range of technology, education, and research organisations over the last 25 years, nationally and internationally. She has significant experience in the CRI sector, having held senior roles at Callaghan Innovation, AgResearch, and Scion.



GARY WILSON GENERAL MANAGER RESEARCH STRATEGY AND PARTNERSHIPS

BSc (Hons), BMus, PhD, Victoria University of Wellington

Gary's role is to guide the organisation's long-term science research direction. He has been instrumental in the delivery of the GNS Science Roadmap, which plots our 10-year strategic direction and describes the contributions our research will make to New Zealand businesses and communities. Gary is also responsible for managing GNS Science's international partnerships.

Gary is also our Chief Scientist, which means he is actively engaged in research.

Prior to joining GNS Science, Gary held a range of academic positions around the world, including at the University of Oxford, Ohio State University, Stanford University and the University of Otago, where he remains an Honorary Professor in Geology and Marine Science.



PETER BENFELL INTERIM GENERAL MANAGER BUSINESS SERVICES

(Interim Chief Executive October 2022-April 2023)

BE (Hons), University of Auckland; DipBusAdmin, Victoria University of Wellington

Peter is responsible for the leadership and management of our business services teams including property and facilities, information services and technology, finance, legal, planning, performance and reporting, risk and assurance, and the project management office. Peter has had more than 30 years' experience in research, science and technology and its successful application, as well as in establishing several major Research and Development partnerships.

Prior to re-joining GNS Science, Peter was Chief Executive at the Infrastructure Industry Training Organisation, Connexis. Peter has held senior management roles at the Foundation for Research, Science and Technology, AgResearch, and Opus International.



TANIA GERRARD
GENERAL MANAGER MĀORI
AND STAKEHOLDER RELATIONS

Te Whanau a Tāpuhi, Ngāti Porou
BA, University of Otago

Tania is responsible for the development and management of our external relationships and partnerships, including with government, iwi/Māori and industry. Tania's role recognises the interconnectedness of the science system, and her team is keenly focused on the benefits our research must deliver to both end-users and New Zealand communities.

Tania has been instrumental in the development of GNS Science's Māori Strategy, Te Punawai o Rangiatea, which will guide our long-term approach to iwi/Māori research and innovation, workforce development, and partner, industry and community engagement.

Prior to joining GNS Science, Tania was Acting Director of Water at the Ministry for the Environment. Here she also held roles specialising in iwi rights and interests, and water rights and interests. She has also held senior roles at the Waitangi Tribunal, the Office of Treaty Settlements, and Ministry for Primary Industries/Fisheries.



LUCIA RONCAGLIA
INTERIM GENERAL
MANAGER SCIENCE

MSc (First Class Hons),
Geology; PhD, Paleontology

Lucia is an experienced geologist with interests in stratigraphy, sedimentology, and environmental research. Her expertise has been applied to the management and delivery of large-scale multi-disciplinary projects and research associated with environment and climate, natural hazards and risks, and energy across many aspects of geosciences in New Zealand

Lucia has previously led the Paleontology Department, and she joined the Science Management Team in 2019 as Department Manager of Surface Geosciences.



DIANE EDWARDS
INTERIM GENERAL MANAGER
PEOPLE AND CULTURE

B.Ed (Hons) London; Dip.Acc.
(VUW;) Dip.Banking, Massey

Diane is responsible for the leadership and management of our HR, administration, H&S, and communications teams. Before joining GNS Science in February 2023, Diane was Director People for the New Zealand Red Cross and prior to that had spent nine years in various GM roles at Ports of Auckland.

Diane has had an eclectic career with roles in human resources, organisational development, safety and wellbeing, communications, ICT, strategic foresight and innovation, change management and sustainability. Her work has taken her around the globe, including stints in the UK, India, Tanzania, USA and Australia.

Diane is a member of numerous professional organisations and has held a number of governance roles in the public, private and NFP sectors.

STRATEGIC SCIENTIFIC AND USER ADVISORY PANEL



DR CHRIS PIGRAM
AM FTSE

Dr Pigram is a geologist with over 40 years' experience. He was the Chief Executive Officer of Geoscience Australia, from 2010-2017. Dr Pigram was made a Member of the Order of Australia in 2019. In 2016 he was elected a Fellow of the Academy of Technological Sciences and Engineering (ATSE).

Dr Pigram was a member of the 2018 Australian Government Resources Taskforce that delivered 29 recommendations designed to ensure the future of the resources sector in Australia. Dr Pigram chairs several committees including the Independent Expert Scientific Committee that advises government on water issues related to large coal mines and coal seam gas developments, the MinEX CRC, CSIRO Minerals Resources Advisory Committee. He is Chair of AuScope Limited, a company that manages research infrastructure funds for the geoscience research community on behalf the Australian Government. He is a member of the Advisory Panel for CSIRO's Deep Earth Imaging Future Science Platform and was appointed to the Australian Space Agency Advisory Group in 2019.



DR TING WANG

Ting is an Associate Professor in the Department of Mathematics and Statistics and Associate Dean Research (Division of Sciences) at the University of Otago. Her research field is multidisciplinary, centring on the interface of statistics and geosciences.

Her main focus has been on the development of statistical models for geophysical hazards such as earthquakes and volcanic eruptions.

Ting has led, managed and participated in national and international collaborative multidisciplinary research projects, including projects funded by EQC, Marsden, MBIE, the Natural Hazards Research Platform, and Resilience to Nature's Challenges. She received the Worsley Early Career Research Award from the New Zealand Statistical Association in 2013, and a University of Otago Early Career Award for Distinction in Research in 2017.



SARAH STUART-BLACK
QSO

Sarah Stuart-Black is the Secretary General for the New Zealand Red Cross. Prior to this role, she was the Deputy Chief Executive and held the statutory role of Director Civil Defence Emergency Management in the National Emergency Management Agency, which was established in December 2019. She joined the Ministry of Civil Defence and Emergency Management in 2003 and held a number of different roles during her time with the Ministry.

Sarah has had a diverse range of experience within New Zealand and England, as well as Ethiopia, Niue and the Solomon Islands. She was a member of the United Nations Disaster Assessment and Coordination Team for nine years and has represented New Zealand at a variety of international forums, bilateral, regional and global meetings, and exercises. Sarah has published a number of papers in international journals and has co-edited three books.



PROFESSOR ROB DUNBAR

Rob is the WM Keck Professor of Earth Sciences and a Senior Fellow of the Woods Institute for the Environment at Stanford University. He leads a research group that works on past, present and future climate change and its impact on oceans and coastal environments. He works with governments, the United Nations and NGOs to help develop and implement solutions to environmental and resource problems. In 2016, he was awarded the Medal of Antarctic Research by the Scientific Committee for Antarctic Research (SCAR). He currently serves on the US National Academies Board on Atmospheric Science and as a Trustee for the Consortium for Ocean Leadership.



DR LUCY JONES

Lucy is the founder of the Dr Lucy Jones Center for Science and Society, whose mission is to foster understanding and application of scientific information in the creation of more resilient communities. Lucy is also a Research Associate at the Seismological Laboratory of Caltech.

With a BA in Chinese Language and Literature from Brown University and a Ph.D. in Seismology from MIT, Lucy furthers resilience to natural hazards through scientific research and collaborations with policy makers, including 33 years with the US Geological Survey, where she created the first Great ShakeOut drill, now a worldwide event with over 60 million participants in 2018. She created methodologies for assessing earthquake probability that have been the basis for all earthquake advisories issued by the State of California.

Lucy has extensive governance experience, and her pioneering science has been recognised with numerous awards, including the 2015 Samuel J. Heyman Service to America Medal and the 2018 Frank Press Medal from the Seismological Society of America.



DR JAMES HUTCHINSON

James is Chief Executive Officer of Kiwi Innovation Network (KiwiNet), a national organisation that funds and supports commercialisation of publicly-funded research for the benefit of Aotearoa New Zealand. He is passionate about the important role that science and the scientific community must play in growing our economy into new high-tech and knowledge-based sectors, informing public policy and changing our world for the better.

James has international experience in supporting research and innovation, with a particular focus on life sciences, global societal challenges and entrepreneurship.



PROFESSOR TE KANI KINGI

Te Kani is Executive Director of Research and Innovation at Te Whare Wānanga o Awanuiārangī.

Te Kani has previously been a member of the AKO Aotearoa Assessment Committee, the Board of the Joint Centre for Disaster Research, a Research Associate of the National Institute for Economic and Demographic Research, and currently Chair of the Te Rau Puawai mental health scholarship programme and a board member of Tane Ora. He was recently appointed to the Veterans' Health Committee, the Prime Minister's Science Awards Panel, the Royal Society of New Zealand's Council, the Independent Science Panel (Sustainable Seas National Science Challenge) and to the Australian Physiotherapy Council Accreditation Board.

Te Kani was born and raised in Poroporo (near Whakatāne) and educated at St Stephen's School (Sth Auckland). He has tribal affiliations to Ngāti Pūkeko, Ngāti Awa, and Ngāi Tai.



DR ANDREW HEAP

Andrew has 20 years' experience leading pre-competitive geoscience research within the Australian Government. This includes more than 17 years as a senior leader in Geoscience Australia, with responsibility for energy and mineral resources, carbon capture and storage, marine geoscience and groundwater programmes. Andrew has published over 100 scientific and technical papers and is a member of 12 professional organisations. Andrew has responsibility for building a national prospectus of energy and mineral groundwater resources across Australia through regional geological framework studies, and delivery of pre-competitive scientific data and information. A key outcome is to stimulate new exploration investment in frontier areas through an improved understanding of under-explored regions and sustainable water management. Andrew is the Geoscience Australia representative to the Geoscience Working Group of the Energy Committee of the Australian Reform Government.



NAMOUTA POUTASI

MNZPI BSc (Hons), BA

Namouta is the Strategy and Science General Manager for Bay of Plenty Regional Council/Toi Moana. Her portfolio includes Resource Management documents (Regional Policy Statement, Regional Natural Resources Plan, Coastal Plan), science, spatial planning, urban growth planning and environmental strategy – focusing mainly in economy aspects and climate change.

Namouta is passionate about giving back to the community by focusing on ways to improve the environmental and socioeconomic outcomes of Pacifica people.

She has worked for both Local and Central Government and is the recipient of awards for her work with tangata whenua and increasing resilience to natural hazards in Samoa. She is also an alumni of the Senior Executives in State and Local Government at Harvard University.



PROFESSOR CLAIRE LENEHAN

Claire is a materials scientist with expertise in, amongst other things, natural materials and fluids, surface and structure modification, isotope and nuclear methods, with applications to Earth system, biological and natural and artificial materials. Claire was a Director of the Australian Institute of Nuclear Science and Engineering (AINSE) between 2014 and 2019 and Chair from 2016-2019. AINSE is the interface between the Australian and New Zealand research entities and the Australian Nuclear Science and Technology Organisation (ANSTO). She was awarded the Robert Catrall Medal for early career success by the Analytical Chemistry Division of the Royal Australian Chemical Institute. Claire has also served as interim dean of the School of Physical and Chemical Sciences at Flinders University.

FINANCIAL PERFORMANCE

GNS Science recorded a loss after tax of \$0.7m compared to a budgeted profit of \$1.8m for the year ended 30 June 2023.

Revenue grew by \$10.4m (10%), however it was \$6.2m down on budget, with disruptions due to COVID-19 and Cyclone Gabrielle delaying some key research contracts until 2023/24.

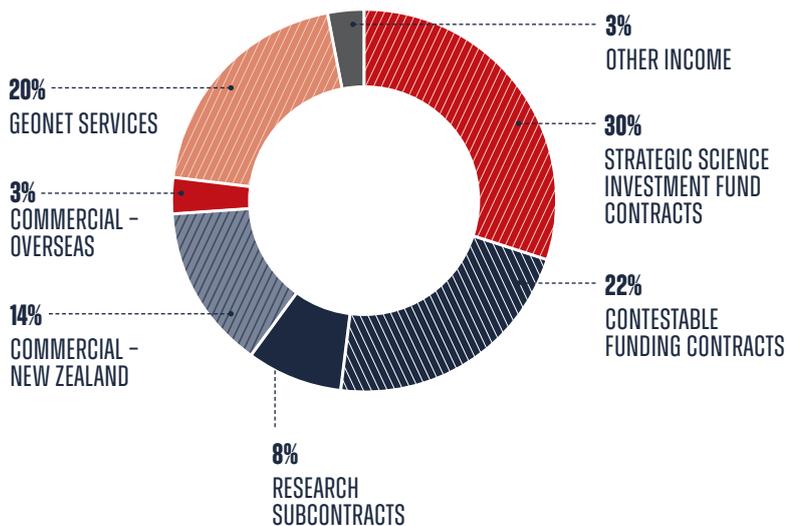
Operating expenditure for the year was \$113.7m, \$11.3m more than the prior year. This reflects the continued investment in our people with remuneration expenses increasing by \$7.2m, as well as the one-time implementation cost of phase two of in our new enterprise system of \$1.1m. Given the challenging inflationary environment it was not possible to stay within budget for some core operating expenses.

GNS Science continued to invest in the replacement and renewal of our assets, including our facilities and equipment, with \$9.5m capital expenditure in the past 12 months.

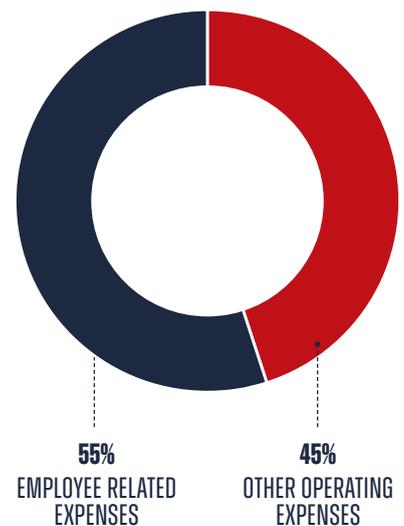
The balance sheet of GNS Science remains strong, with no debt, and liquidity of \$27.1m.

OUR NUMBERS AT A GLANCE

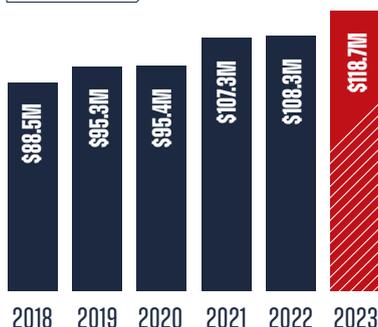
REVENUE



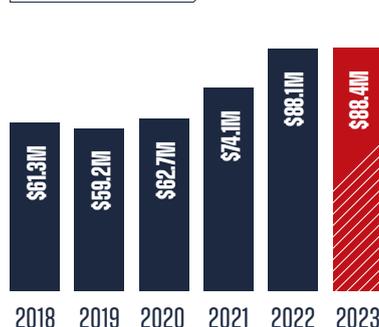
HOW WE SPENT OUR MONEY



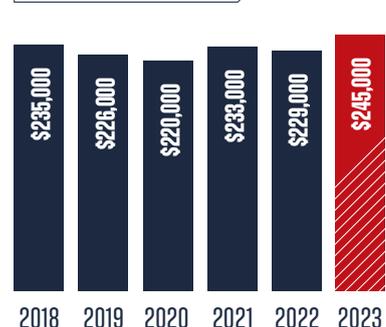
REVENUE



TOTAL ASSETS



REVENUE PER FTE



FINANCIAL PERFORMANCE INDICATORS

GROUP RATIOS AND STATISTICS

	Actual 2023	Budget 2023	Actual 2022
Revenue (\$000)			
Revenue	118,695	124,847	108,280
Revenue growth	10%	12.7%	1%
Operating results (\$000)			
Operating expenses (including depreciation and amortisation)	113,730	114,227	102,404
EBITDA	4,965	10,620	5,876
EBIT	(2,097)	2,376	(1,599)
Profit/(loss) before tax	(882)	2,526	(1,349)
Profit/(loss) after tax	(707)	1,819	(1,020)
EBITDA per FTE	10	22	12
Total assets	85,440	88,619	88,114
Total equity	39,397	42,198	40,105
Capital expenditure	9,877	14,205	7,875
Liquidity			
Quick ratio	2.3	1.3	3.3
Profitability			
Return on equity	(1.80%)	4.50%	(2.90%)
Operating margin	4.20%	8.50%	5.40%
Operational risk			
Profit volatility	52.40%	50.50%	48.50%
Forecasting risk	4.70%	6.70%	6.80%
Growth/Investment			
Capital renewal (before impairment adjustments)	1.3	2.8	2.6
Dividend (\$000)	-	-	-
Financial Strength			
Equity ratio	46.20%	47.60%	45.50%

REPORT OF THE DIRECTORS

For the year ended 30 June 2023

The Directors are pleased to present the audited financial statements of GNS Science for the year ended 30 June 2023. The financial statements have been prepared in accordance with generally accepted accounting practice in New Zealand and the Financial Reporting Act 1993.

The Controller and Auditor-General is the statutory auditor pursuant to section 21 of the Crown Research Institutes Act 1992. The Office of the Auditor-General, pursuant to section 29 of the Public Finance Act 1989, has appointed Deloitte to undertake the audit on its behalf.

PRINCIPAL ACTIVITY

GNS Science's principal activity is to conduct scientific research, consultancy services, and product development in Earth sciences and isotope technologies in accordance with the principles for the operation of Crown Research Institutes set out in sections 4 and 5 of the Crown Research Institutes Act 1992.

BOARD CHANGES DURING THE YEAR

The following changes affected the membership of the Board for the year ended 30 June 2023:

Director	Ceased Date	Appointment Date
David Smol		1 May 2023
Nicola Crauford	1 May 2023	
Livia Esterhazy		1 June 2023
Brian Young		1 June 2023

REMUNERATION OF DIRECTORS

Directors' fees are set by the shareholding Ministers annually. Fees paid to Directors for services as a Director, including membership of Board committees, during the year were as follows:

Director	Date commenced	2023 \$	2022 \$
Nicola Crauford	1 July 2015*	35,517	47,356
Paul White	14 August 2017	23,678	23,678
John Sharpe	1 September 2016	28,118	23,678
Felicity Evans	1 July 2018	23,678	23,678
Andrew Cordner	1 February 2022	23,678	9,886
Wendy Venter	1 February 2022	23,678	9,886
David Smol	1 May 2023	7,892	-
Livia Esterhazy	1 June 2023	1,973 [†]	-
Brian Young	1 June 2023	1,973 [†]	-

*Term completed on 1 May 2023

[†]Directors' fees the Director is entitled to receive, but not paid during the 2022/23 year.

John Sharpe received an additional Directors' fee of \$5,000 in the 2022/23 year as the GNS Science appointed director to the start-up company Bspkl Ltd.

No other Director either received, or became entitled to receive, any benefit other than the disclosed Directors' fees during the year.

CHIEF EXECUTIVE REMUNERATION

The Chief Executive's remuneration is approved by the Board, on the recommendation of the People and Culture Committee. External advice is incorporated as needed, and recommendations are made to the Board in regard to the Chief Executive's contractual arrangements, including remuneration.

The overarching elements of the approach to remuneration for the Chief Executive (consistent with all GNS Science staff) include: simplicity, clarity, fairness and consistency of application, along with:

1. A holistic view of reward;
2. An appropriate link between reward and business performance;
3. A rewards programme that helps to drive a positive and enabling culture;
4. People being rewarded competitively in a context of affordability;
5. Regular review and analysis of the effectiveness and fairness of the remuneration and rewards framework to ensure it continues to meet both GNS Science and employee needs.

Ian Simpson was appointed Chief Executive in January 2017, and resigned from GNS Science in September 2022. His remuneration comprised salary and KiwiSaver benefits, and did not include any separate component conditional on performance.

Peter Benfell was appointed interim Chief Executive for the period September 2022 to April 2023. His remuneration comprised salary and KiwiSaver benefits, and did not include any separate component conditional on performance.

Chelydra Percy was appointed Chief Executive in May 2023. Her remuneration comprises salary and KiwiSaver benefits, and does not include any separate component conditional on performance.

	Ian Simpson					Peter Benfell	Chelydra Percy
	FY 2019 \$	FY 2020 \$	FY 2021 \$	FY 2022 \$	FY 2023 \$	FY 2023 \$	FY 2023 \$
Salary	468,932	468,932	468,932	469,834	205,713	238,039	75,269
KiwiSaver	14,068	14,068	14,068	14,095	6,171	7,141	2,258
Total	483,000	483,000	483,000	483,929	211,884	245,180	77,527

EMPLOYEE REMUNERATION

In accordance with section 211(1)(g) of the Companies Act 1993, the numbers of employees who received remuneration and other benefits totalling \$100,000 or more, in \$10,000 bands, during the year were:

\$000	2023	2022
100-110	49	43
110-120	38	48
120-130	52	21
130-140	25	36
140-150	33	22
150-160	21	10
160-170	9	14
170-180	17	4
180-190	6	8
190-200	10	2
200-210	2	6
210-220	7	1
220-230	4	2
230-240	2	1
240-250	-	-
250-260	1	1
260-270	-	-
270-280	1	-
280-290	-	1
290-300	1	-
300-310	1	1
330-340	-	1
390-400	1	-
480-490	-	1
Total	280	223

SUBSIDIARIES

The Company has five subsidiary companies:

- Isoscan Limited
- Geological Surveys (New Zealand) Limited
- Isoscan Food Limited
- Geological Risk Limited
- GNS Science International Limited

David Smol and Peter Benfell were Directors of each of the subsidiary companies at 30 June 2023.

DIVIDENDS

No dividend was declared during the year to 30 June 2023 (2022: \$nil).

DIRECTORS' INDEMNITY AND INTERESTS

The Company has insurance cover for Directors in respect of any act or omission in their capacity as a Director of the Company. Directors have declared their interests in a Deed of Indemnity dated 29 November 2017, whereby the Company indemnifies Directors against any liability for any act or omissions incurred in their capacity as a Director. The indemnity for liabilities incurred does not extend to criminal liability or liability for breach of a fiduciary duty owed to the Company.

Directors' interests disclosed at 30 June 2023 are set out in the table opposite. These interests have been appropriately recorded in the Company's Disclosure of Interests Register, which is updated at the start of every Board meeting.

EVENTS AFTER BALANCE DATE

The Directors are not aware of any matter or circumstance since the end of the financial year not otherwise dealt with in this report that has, or may have, a significant effect on the operation of the Company.

CERTIFICATIONS

The Directors confirm that the Company has operated in accordance with the Crown Research Institutes Act 1992, Crown Entities Act 2004 and the Companies Act 1993 during the year.

The activities undertaken by the Company in the year are in accordance with GNS Science's Statement of Core Purpose.

No written direction was received from either shareholding Minister in the year.



For and on behalf of the Board

David Smol
Chair
26 September 2023

DIRECTORS' INTERESTS DISCLOSED AT 30 JUNE 2023

Director	Position	Organisation
David Smol	Director	Contact Energy Limited
	Director	Co-operative Bank
	Member	Waka Kotahi (NZTA)
	Chair	Victoria Link Limited
	Chair	Department of Internal Affairs External Advisory Committee
	Chair	Ministry of Social Development Risk and Audit Committee
	Member	Ministry of Housing and Urban Development Strategic Advisory Committee
John Sharpe	Director and Shareholder	Weka Labs Limited
	Executive Vice President	Flow Cytometry-Inguran, LLC, dba STgenetics
	Director	Bspkl Limited
Paul White	Member	Te Rarawa Iwi
	Director and Shareholder	Torea Tai Consultants Limited
	Executive Member	Te Matapihi (Māori housing body)
	Governance Group Member	Sector Climate Change Commitment; Māori Workstream
	Trustee	Top Energy Consumer Fund
Felicity Evans	Member	Defence Employer Support Council (DESC)
	Member	Advisory Board of Dignity Limited
	Chair	Endometriosis New Zealand
Andrew Cordner	Director	Fonterra LATAM Brands Limited (New Zealand)
	Director	Fonterra Chile SpA (Chile)
	Board Trustee	St Andrew's Village Trust (Inc.)
	Member	New Zealand Law Society National Standards Committee
	Director of Legal	Fonterra Co-operative Group Limited
Wendy Venter	Director and Shareholder	Venter Consulting Limited
	Director	The New Zealand Institute for Plant and Food Research Limited
	Trustee	Nikau Foundation
	Member	The Treasury's Audit Committee for the Financial Statements of Government
	Chair	Parliamentary Counsel Office Audit and Risk Committee
	Chair	Statistics New Zealand Risk and Assurance Committee
	Member	New Zealand Auditing and Assurance Standards Board
	Member	Development West Coast – Advisory Body
	Member	Oranga Tamariki Transformation Advisory Board
	Member	Public Service Commission Integrity and Ethics Advisory Board
	External Member	Wellington City Council Audit and Risk Committee
	Brian Young	Board Member
Chief Executive		International Accreditation New Zealand (IANZ)
Livia Esterhazy	Director	National Institute of Water and Atmospheric Research Limited
	Director and Founder	The Thrive Collective Limited
	Programme Director for A Lighter Touch	Horticulture New Zealand Limited

FINANCIAL STATEMENTS

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

For the year ended 30 June 2023

<i>in thousands of New Zealand dollars</i>	Note	Actual 2023	Actual 2022	Budget 2023
Revenue				
Research contracts		70,589	68,386	73,756
Commercial		21,265	18,390	24,998
GeoNet services		23,815	18,919	23,437
Other income		3,026	2,585	2,656
Total revenue	2	118,695	108,280	124,847
Operating Expenses				
Employee benefit expenses		62,065	54,830	60,225
Other operating expenses	3	51,665	47,576	54,003
Total operating expenses		113,730	102,406	114,228
Profit before interest, tax, depreciation and amortisation		4,965	5,874	10,619
Depreciation	6	6,785	7,325	8,243
Amortisation and impairment	7	277	151	-
Profit/(loss) before interest and tax		(2,097)	(1,602)	2,376
Interest income		1,215	250	150
Finance expense		-	-	-
Profit/(loss) before tax		(882)	(1,352)	2,526
Income tax credit / (expense)	4	175	329	(707)
Profit/(loss) after tax		(707)	(1,023)	1,819
Other comprehensive income		-	-	-
Total comprehensive income / (loss) attributable to owners		(707)	(1,023)	1,819

The accompanying notes form part of these financial statements

CONSOLIDATED STATEMENT OF CHANGES IN EQUITY

For the year ended 30 June 2023

<i>in thousands of New Zealand dollars</i>	Share capital	Equity reserves	Total equity
		Retained earnings	
Balance at 30 June 2021	6,167	34,960	41,127
Net loss after tax	-	(1,023)	(1,023)
Balance at 30 June 2022	6,167	33,937	40,104
Net loss after tax	-	(707)	(707)
Balance at 30 June 2023	6,167	33,230	39,397

The accompanying notes form part of these financial statements

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

As at 30 June 2023

<i>in thousands of New Zealand dollars</i>	Note	Actual 2023	Actual 2022
Equity			
Share capital	5	6,167	6,167
Equity reserves		33,230	33,937
Total equity		39,397	40,104
<i>Represented by:</i>			
Non-current assets			
Property, plant and equipment	6	41,471	39,094
Intangible assets	7	335	546
Deferred tax	9	3,172	2,857
Investments		30	30
Total non-current assets		45,008	42,527
Current assets			
Cash and cash equivalents		13,547	19,277
Short term investments		13,622	13,171
Trade receivables	8	7,964	7,460
Prepayments		3,997	3,853
Current tax		175	-
Contract assets	2	4,127	1,826
Total current assets		43,432	45,587
Total assets		88,440	88,114
Non-current liabilities			
Non-current provisions	10	1,623	1,417
Capital Grants from Crown (long-term portion)	2	13,230	11,390
Total non-current liabilities		14,853	12,807
Current liabilities			
Trade and other payables	11	9,240	8,103
Current provisions	10	4,161	4,107
Contract liabilities	2	18,932	20,546
Capital Grants from Crown (current portion)	2	1,857	1,991
Provision for income tax		-	456
Provision for dividend	5	-	-
Total current liabilities		34,190	35,203
Total liabilities		49,043	48,010
Net assets		39,397	40,104

For and on behalf of the Board:



David Smol
Chair
26 September 2023



Wendy Venter
Board member
26 September 2023

CONSOLIDATED STATEMENT OF CASH FLOWS

For the year ended 30 June 2023

<i>in thousands of New Zealand dollars</i>	Note	Actual 2023	Actual 2022
Cash flows from operating activities			
<i>Cash was provided from:</i>			
Receipts from customers		111,705	112,707
Interest received		1,151	139
		112,856	112,846
<i>Cash was applied to:</i>			
Payments to suppliers and employees		(112,097)	(107,846)
Interest paid		-	-
Income tax paid		(771)	(2,424)
		(112,868)	(110,270)
Net cash flows from operating activities	12	(12)	2,576
Cash flows from investing activities			
<i>Cash was provided from:</i>			
Sale of property, plant and equipment		150	93
Receipts of capital funding in advance		4,190	3,803
Maturity of short term investments		13,170	8,079
		17,510	11,975
<i>Cash was applied to:</i>			
Purchase of property, plant, equipment and intangible assets		(9,606)	(7,875)
Placement of short term investments		(13,622)	(13,170)
		(23,228)	(21,045)
Net cash flows from investing activities		(5,718)	(9,070)
Net increase / (decrease) in cash and cash equivalents		(5,730)	(6,494)
Effects of exchange rate changes on the balance of cash held in foreign currencies		-	-
Opening cash and cash equivalents		19,277	25,771
Closing cash and cash equivalents		13,547	19,277

The accompanying notes form part of these financial statements

NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

1. REPORTING ENTITY AND ACTIVITIES

The Institute of Geological and Nuclear Sciences Limited (trading as GNS Science) is established under the Crown Research Institutes Act 1992 and the Companies Act 1993. Its subsidiary companies are established under the Companies Act 1993. These financial statements have been prepared in accordance with the Crown Research Institutes Act 1992, the Public Finance Act 1989, the Companies Act 1993, the Crown Entities Act 2004 and the Financial Reporting Act 2013.

Consolidated financial statements for the Group comprising the Institute of Geological and Nuclear Sciences Limited (the Parent) and its subsidiaries are presented, and the effects of intra-group transactions are eliminated in the consolidated financial statements. Subsidiaries are those entities controlled by the Parent. Control is achieved where the Parent has the power to govern the financial and operating policies of an entity to obtain benefits from its activities.

The wholly owned subsidiaries of the Parent are:

- Isoscan Limited
- Isoscan Food Limited
- Geological Surveys (New Zealand) Limited
- Geological Risk Limited
- GNS Science International Limited

The principal activities of the Group are to undertake geoscience and isotope science research, development and commercial projects, predominantly in New Zealand. GNS Science International Limited holds a 50% interest in EDDI Project, an unincorporated joint operation formed to undertake a contract for dam hazard management in Vietnam.

2. REVENUE

Strategic Science Investment Fund

The Parent is party to a Strategic Science Investment Fund agreement with the Crown to perform research activities that support the Parent's Statement of Core Purpose. Revenue under this contract is treated as a Government Grant under NZ IAS 20 *Accounting for Government Grants and Disclosure of Government Assistance*. All core funded contracts were completed in accordance with the agreement during the year.

Revenue from other research and commercial contracts

Revenue from other research and commercial contracts is accounted for in accordance with NZ IFRS 15 *Revenue from Contracts with Customers*. Revenue earned from the supply of goods and services is measured at the fair value of consideration received.

The Group recognises revenue based on the consideration to which the Group expects to be entitled in a contract with a customer. Revenue from services is recognised on the stage of completion of the contract. Any amounts received in relation to work not yet commenced are recorded as revenue in advance.

Revenue from the supply of goods is recognised when the significant risks and rewards of ownership of the goods have been transferred to the buyer.

Where any entitlement condition is not yet met, amounts already received are recorded as a contract liability (revenue in advance). Contract assets (work in progress) are recorded for work performed, where funding is expected but has not yet been received.

Any amounts previously recognised as a contract asset are transferred to Trade Receivables at the point the customer is invoiced for the product or service delivered.

There is not considered to be a significant finance component to the valuation of revenue, due to revenue generally being recognised during the period of related services/products delivery, or within one year.

Revenue for the year was derived as follows:

<i>in thousands of New Zealand dollars</i>	2023	2022
Strategic Science Investment Fund contracts	34,970	34,094
Contestable funding contracts	25,345	25,506
Marsden funding contracts	1,579	912
Research subcontracts	8,695	7,874
Research contracts	70,589	68,386
Commercial – New Zealand	17,390	15,718
Commercial – overseas	3,875	2,672
Commercial revenue	21,265	18,390
GeoNet services	23,815	18,919
Other income	3,026	2,585
Total revenue	118,695	108,280

A total of \$16.7m (2022: \$13.7m) of revenue recognised in 2023 relates to funds that were included in contract liabilities (revenue in advance) at 30 June 2022.

Movement in contract assets and liabilities

Contract assets and liabilities vary from year to year, dependent on the delivery terms of contracted work, and the timing of agreed invoicing or funding received between the Group and contracted parties.

The movement in contract assets and liabilities, relating to all sources of revenue is as follows:

<i>in thousands of New Zealand dollars</i>	2023	2022
Contract assets		
Work in progress at 1 July	1,826	2,297
Increase/(decrease) during the year	2,301	(471)
Work in progress at 30 June	4,127	1,826
Contract liabilities		
Revenue in advance at 1 July	20,546	15,833
Increase/(decrease) during the year	(1,614)	4,713
Revenue in Advance at 30 June	18,932	20,546

Capital Grants from Crown in relation to GeoNet

Government grants received in specie or in cash for the acquisition of network assets, are recognised at their fair value and held on the Statement of Financial Position as a deferred credit and recognised as revenue over the periods necessary to match the related depreciation charges, or other expenses of these assets, as they are incurred. Refer to note 6 for the disclosure of these assets.

<i>in thousands of New Zealand dollars</i>	2023	2022
Crown Grants for Capital		
Capital Grants in advance at 1 July	13,381	11,566
Cash received in advance	4,190	3,802
	17,571	15,368
Recognised as revenue	(2,484)	(1,987)
Balance at 30 June	15,087	13,381
Represented by		
Current portion	1,857	1,991
Non-current portion	13,230	11,390
Capital Grants at 30 June	15,087	13,381

3. EMPLOYEE BENEFIT EXPENSES AND OPERATING EXPENSES

Employee benefit expenses includes an amount of \$18,444 (2022: \$nil) relating to termination benefits payable at 30 June 2023.

Operating expenses are made up as follows:

<i>in thousands of New Zealand dollars</i>	2023	2022
Services and contracts	20,895	17,209
Research contracts	16,243	18,868
SaaS implementation cost	1,092	3,626
Site and communication	3,203	2,639
Materials and supplies	3,740	2,604
Travel and vehicle	3,198	1,169
Conferences and training	1,746	884
Rent	371	336
Directors' fees	176	147
Auditor's remuneration – audit services	264	99
Bad debts and credit losses on doubtful debts	(2)	(43)
Foreign exchange loss/(gain)	96	3
Loss/(gain) on disposal of property, plant and equipment	230	(93)
Other operating expenses	413	128
Total operating expenses	51,665	47,576

SaaS implementation cost

The Parent entered into a Software as a Service (SaaS) contract with Workday on 30 June 2021, as well as contracts with third parties for the implementation of a joint enterprise system together with the Institute of Environmental Science and Research (ESR).

Implementation costs of \$1.9m were incurred during the period of which \$0.8m were reimbursed by ESR under the relevant contract terms, reflecting their share of the implementation. These amounts are represented net within operating expenses, reflecting the substance of the contractual arrangements.

The implementation costs are expensed when incurred, in accordance with guidance issued by the International Financial Reporting Interpretations Committee. Where amounts are due to the SaaS provider these have been recorded in full within trade payables and where amounts are due from ESR these are reflected in accounts receivable as the Parent holds the credit risk associated with collection.

4. INCOME TAX

The income tax expense is determined as follows:

<i>in thousands of New Zealand dollars</i>	2023	2022
Reconciliation of income tax expense		
Profit/(loss) before income tax	(882)	(1,352)
Tax at rate of 28%	(247)	(376)
Non-deductible items in determining assessable income	72	(15)
Prior period adjustment	-	62
Total tax expense/(credit)	(175)	(329)

The taxation charge is represented by

Current tax	140	622
Deferred tax	(315)	(951)
Total tax expense/(credit)	(175)	(329)

Under Section OB1(2)(d) of the Income Tax Act (2007), the Parent is not required to maintain an imputation credit account.

Inland Revenue issued a guidance note on the tax treatment of Software as a Service (SaaS) customisation and configuration costs in March 2023. These costs are to be capitalised and depreciated for tax purposes rather than being immediately deducted in the year of being expensed.

During the current year, the Parent has spent \$1.1m (2022: \$3.6m) (net of amounts reimbursed) on establishment costs for its new Workday ERP. This is operated on a SaaS model and has been recognised as operating expenditure for financial reporting purposes.

For tax purposes, these ERP costs of \$1.1m (2022: \$3.6m) have been capitalised and depreciated in the 2023 year using the diminution value method from 1 March 2023 (2022: 1 July 2022) (i.e., the date when the ERP system components relating to these costs went live).

A deferred tax asset is recognised on the future deductible amount arising from these ERP costs.

5. SHARE CAPITAL

<i>in thousands of New Zealand dollars</i>	2023	2022
Authorised and Issued Capital: 6,167,000 ordinary shares	6,167	6,167

All ordinary shares rank equally with respect to dividends and repayment of capital and each carry the right to one vote at any annual meeting.

No dividend has been declared for the year ended 30 June 2023 (2022: \$nil).

6. PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment are stated at cost less accumulated depreciation and impairment. Cost includes expenditure that is directly attributable to the acquisition and/or construction of the item. Assets have been depreciated on a straight-line basis at rates calculated to allocate the assets' cost over their estimated remaining useful lives. Freehold land is not depreciated.

The estimated useful lives, residual values and depreciation methods are reviewed annually, with the effect of any changes in estimate accounted for on a prospective basis.

The gain or loss arising on the disposal or retirement of an item of property, plant and equipment is recognised in the Statement of Comprehensive Income.

The following useful lives are used in the calculation of depreciation:

Buildings and improvements:	
wooden construction	40 years
concrete construction	50 years
improvements	10 - 20 years
Plant, machinery and laboratory equipment	3 - 15 years
Furniture, fittings and office equipment	3 - 15 years
IT equipment	4 - 8 years
Vehicles	5 years

Heritage assets – collections, library and databases

The two major collections are:
The National Paleontological Collection
The National Petrological Reference Collection

The Parent owns various collections, library resources and databases that are an integral part of the research work undertaken by the Parent. These collections are highly specialised and there is no reliable basis for establishing a valuation.

in thousands of New Zealand dollars

	Land	Buildings and improvements	Network assets	Plant and machinery	Laboratory equipment	IT equipment	Furniture, fittings and office equipment	Vehicles	Total
Cost									
Balance at 1 July 2021	2,527	22,813	-	5,017	36,476	9,765	4,530	1,432	82,560
Additions	-	509	14,742	1,185	1,000	907	355	485	19,183
Disposals	-	-	(126)	(21)	(365)	(200)	(10)	(510)	(1,232)
Balance at 30 June 2022	2,527	23,322	14,616	6,181	37,111	10,472	4,875	1,407	100,511
Additions	-	435	3,940	1,711	1,025	1,575	201	653	9,540
Disposals	-	(11)	(578)	(2)	(7)	(4)	(1)	(505)	(1,108)
Balance at 30 June 2023	2,527	23,746	17,978	7,890	38,129	12,043	5,075	1,555	108,943
Accumulated depreciation									
Balance at 1 July 2021	-	13,937	-	3,518	25,995	7,539	3,148	1,084	55,221
Disposals	-	-	(25)	(21)	(365)	(200)	(8)	(510)	(1,129)
Depreciation	-	978	2,013	280	2,066	1,548	265	175	7,325
Balance at 30 June 2022	-	14,915	1,988	3,777	27,696	8,887	3,405	749	61,417
Disposals	-	(11)	(200)	-	(7)	(4)	(1)	(505)	(728)
Depreciation	-	777	2,106	286	1,971	1,129	272	242	6,783
Balance at 30 June 2023	-	15,681	3,894	4,063	29,660	10,012	3,676	486	67,472
Net book value at 30 June 2022	2,527	8,407	12,628	2,404	9,415	1,585	1,470	658	39,094
Net book value at 30 June 2023	2,527	8,065	14,084	3,827	8,469	2,031	1,399	1,069	41,471

Included in the total net book value of property, plant and equipment are assets under construction of \$6.6m (2022: \$4.7m).

7. INTANGIBLE ASSETS

Software, patents and capitalised development costs have a finite life and are included at cost less accumulated amortisation and impairment.

Amortisation is charged on a straight-line basis at rates calculated to allocate the assets' cost over their estimated remaining useful lives.

The estimated useful life and amortisation method are reviewed annually, with the effect of any changes in estimate being accounted for on a prospective basis.

The following useful lives are used in the calculation of amortisation:

Software	4 - 8 years
Capitalised development costs	4 - 8 years
Patents	4 - 20 years

in thousands of New Zealand dollars

	Software	Patents	Capitalised development costs	Total
Cost				
Balance at 1 July 2021	6,094	138	515	6,747
Additions	(73)	-	410	337
Disposals	(5)	-	-	(5)
Balance at 30 June 2022	6,016	138	925	7,079
Additions	-	-	66	66
Disposals	(11)	-	-	(11)
Balance at 30 June 2023	6,005	138	991	7,134
Accumulated amortisation				
Balance at 1 July 2021	5,788	84	515	6,387
Amortisation	142	9	-	151
Disposals	(5)	-	-	(5)
Balance at 30 June 2022	5,925	93	515	6,533
Amortisation	59	20	198	277
Disposals	(11)	-	-	(11)
Balance at 30 June 2023	5,973	113	713	6,799
Net book value at 30 June 2022	91	45	410	546
Net book value at 30 June 2023	32	25	278	335

8. TRADE RECEIVABLES

<i>in thousands of New Zealand dollars</i>	2023	2022
Trade receivables	7,969	7,484
Allowance for credit losses from doubtful debts	(5)	(24)
Total trade receivables	7,964	7,460

Ageing profile of past due trade receivables at balance date

<i>in thousands of New Zealand dollars</i>	2023	2022
Past due 1-30 days	822	598
Past due 31-60 days	61	50
Past due over 61 days	268	40
Total past due trade receivables	1,151	688

The Group recognises a loss allowance for expected credit losses on trade receivables. The amount of expected credit losses is updated at each reporting date to reflect changes in the assessed credit risk since initial recognition of the respective receivable.

At 30 June 2023 all overdue receivables have been assessed for impairment and appropriate provisions for estimated credit losses applied.

The credit quality of trade receivables that are past due but not impaired is otherwise considered sound.

The carrying value of receivables is considered to approximate their fair value.

Movement in the allowance for credit losses

<i>in thousands of New Zealand dollars</i>	2023	2022
Balance at 1 July	23	72
Accounts written off during year	-	(6)
Increase/(decrease) in credit loss allowance recognised in profit / loss before tax	(18)	10
Reversal of credit loss allowances on receivables subsequently received	-	(53)
Total allowance for credit losses at 30 June	5	23

9. DEFERRED TAX

Deferred tax is accounted for using the comprehensive Balance Sheet liability method in respect of temporary differences arising from differences between the carrying amount of assets and liabilities in the financial statements and the corresponding tax base of those items. In principle, deferred tax assets or liabilities are recognised for taxable temporary differences.

Deferred tax assets are recognised to the extent that it is probable that sufficient taxable amounts will be available against which deductible temporary differences or unused tax losses and tax offsets can be utilised.

The carrying amount of deferred tax assets is reviewed and reduced to the extent that it is no longer probable that sufficient assessable income will be available to allow all or part of the assets to be recovered.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the period in which the liability is settled or the asset realised.

Analysis of temporary differences

<i>in thousands of New Zealand dollars</i>	2023	2022
Deferred tax assets/(liabilities) arise from the following:		
Property, plant and equipment	78	389
Intangible assets	6	15
Provisions	2,326	1,942
Allowance for credit losses from doubtful debts	2	7
Capitalised relocation expenses	1	-
Capitalised SaaS expenses	759	504
Deferred tax asset recognised at 30 June	3,172	2,857

Movements in deferred tax

<i>in thousands of New Zealand dollars</i>	2023	2022
Balance at 1 July 2021	2,857	1,907
Charged to income	315	950
Total deferred tax asset at 30 June 2022	3,172	2,857

The amount charged to income in 2023 included an adjustment in respect of ERP costs, for which a deferred tax asset had been recognised in respect of depreciation.

10. EMPLOYEE ENTITLEMENTS

Liabilities for wages and salaries, annual leave, long service leave and retirement leave are recognised when it is probable that settlement will be required and they are capable of being reliably measured.

Employee benefits to be settled within twelve months are reported at the amount expected to be paid and are classified as current liabilities. Employee benefits not expected to be settled within twelve months are reported at the present value of the estimated future cash outflows.

Provisions for long service leave and retirement leave depend on a number of assumptions such as the expected employment period of employees and salary levels. During the course of the year, we have adopted the standard New Zealand Treasury model and assumptions for valuing long service leave provisions, resulting in a reduction in non-current long service leave provisions.

<i>in thousands of New Zealand dollars</i>	2023	Current		Non-current	
		2022	2023	2022	2023
Annual leave	3,767	3,659	952	807	
Long service leave	358	413	624	560	
Retirement leave	36	35	47	50	
Total provision for employee entitlements	4,161	4,107	1,623	1,417	

11. TRADE AND OTHER PAYABLES

<i>in thousands of New Zealand dollars</i>	2023	2022
Trade payables	2,973	418
Accrued expenses	6,267	7,685
Total trade and other payables	9,240	8,103

Trade and other payables are non-interest bearing. The Parent follows government procurement rules with regard to prompt payment and seeks to make payment to all domestic suppliers within 10 business days. The carrying value of creditors and other payables approximates their fair value.

12. CASH AND CASH FLOWS

Cash and cash equivalents and short-term investments

Cash and cash equivalents consist of deposits at call and short-term deposits with original maturities of less than three months. Short-term deposits consist of investments with original maturity periods of between three and twelve months and are presented as a separate line item in the financial statements.

Reconciliation of profit after tax to net cash flows from operating activities

<i>in thousands of New Zealand dollars</i>	2023	2022
Profit/(loss) after tax	(707)	(1,023)
Adjust items classified as investing activities:		
Net loss/(gain) on disposal of property, plant and equipment	229	(93)
Adjust non-cash items:		
Depreciation	6,785	7,325
Amortisation and impairment	277	151
Decrease in credit allowance for doubtful debts	(18)	(49)
Amortisation of Capital Grants	(2,484)	-
Decrease in provision for income tax	(631)	(1,803)
Increase in deferred tax asset	(315)	(950)
Increase in non-current provisions	206	138
	3,820	4,812
Adjust movements in working capital items:		
Increase in accounts receivable and prepayments	(630)	(2,900)
Decrease in payables, current provisions and revenue in advance	(423)	1,287
Change in receivables and payables relating to investing activities	-	22
(Increase)/decrease in work in progress	(2,301)	471
	(3,354)	(1,120)
Net cash flows from operating activities	(12)	2,576

13. RELATED PARTY TRANSACTIONS

The Crown is the ultimate shareholder of the Parent. No transactions with New Zealand Government owned entities are considered as related party transactions in terms of NZ IAS 24 *Related Party Disclosures*.

The total remuneration paid to Directors and key management personnel during the year was as follows:

<i>in thousands of New Zealand dollars</i>	2023	2022
Key management personnel remuneration comprised:		
Directors' fees	176	147
Salaries of the Chief Executive and Executive Leadership Team	2,205	1,908
Total key management personnel remuneration at 30 June	2,381	2,055

Key management personnel, considered to be the Directors and Executive Leadership Team Management, are those people with responsibility and authority for planning, directing and controlling the activities of the entity. A number of key management personnel also provide directorship services to third-party entities that have transacted with the Group during the reporting period.

The Board Chair stepped down on 1 May 2023. A new Chair was appointed to the Board from 1 May 2023. Two new Directors were appointed on 1 June 2023.

Balances and transactions between the Company and its subsidiaries, which are related parties, have been eliminated on consolidation and are not disclosed in this note.

Transactions between entities in the Group and Damwatch Projects Limited are disclosed below. Damwatch Projects Limited is a related party because it was a 50% partner with GNS Science (2022: GNS Science International Limited), of the EDDI Project, an unincorporated joint operation.

<i>in thousands of New Zealand dollars</i>		Revenue/purchases		Amounts payable/receivable	
		2023	2022	2023	2022
GNS Science International Limited	Revenue	-	261	Payable by GNSSI	-
Institute of Geological and Nuclear Sciences Limited	Revenue	312	-	Payable by GNSSI	-
JV with Damwatch Projects Limited	Purchases	312	261	Receivable by GNSSI	-

The amounts owed between the parties are unsecured and have been settled in cash. The debt owed by the joint operation to GNS Science International Limited has been reduced by 50% on consolidation in these accounts: it was paid in full on 1 July 2023. No guarantees have been given or received. No provisions have been made for doubtful debts in respect of any amounts owed between related parties. Distributions owing to GNS Science International Limited at 30 June 2023 was \$1,065.

The Parent also holds a 10% interest in b.spkl Limited with Dr. John Sharpe as a co-director. b.spkl is a startup New Zealand-based manufacturer of high-performance catalyst coated membranes.

14. FINANCIAL INSTRUMENTS

Capital management

The Group manages its capital to ensure that entities in the Group will operate in a financially responsible manner, be financially viable and continue as going concerns.

The Group is not subject to any externally imposed capital requirements.

Currency risk

The Group undertakes certain transactions denominated in foreign currencies. Exchange rate exposures may be managed within approved policy limits using forward foreign exchange contracts.

These derivative financial instruments are initially recognised at fair value on the date the derivative contract is entered into and are subsequently

remeasured to their fair value at the end of each reporting period. Derivatives are carried as assets when the fair value is positive and as liabilities when the fair value is negative. The resulting gain or loss is recognised in the Statement of Comprehensive Income immediately.

At 30 June the carrying amounts of the Group's foreign currency New Zealand denominated assets and liabilities were:

<i>in thousands of New Zealand dollars</i>	Liabilities		Assets	
	2023	2022	2023	2022
Australian Dollar	51	3	612	76
Canadian Dollar	-	-	3	1
Euro	-	-	121	9
Pounds Sterling	-	-	1	5
Swiss Franc	-	10	-	-
US Dollar	-	4	138	80
	51	17	875	171

Interest rate risk

The Group has deposits on call as well as short-term deposits on which interest is earned. Where possible, the Group manages exposures to interest rate fluctuations through prudent management of its treasury operations. Interest rates for short-term deposits totalling \$13.6m held at 30 June 2023 ranged between of 5.35% and 6.45% (2022: 1.70% and 3.95%).

In managing interest rate risks the Group aims to reduce the impact of short-term fluctuations on earnings. Over the longer-term permanent changes in interest rates will have an impact on profit.

Market risk and sensitivity analysis

As at 30 June 2023, if the New Zealand dollar had strengthened by 5% against foreign currencies, with all other variables

held constant, the profit before tax for the year would have increased by \$185,000 (2022: increase \$210,000). A 5% weakening of the New Zealand Dollar would have decreased reported profit before tax by \$195,000 (2022: decrease \$220,000).

If interest rates had been 50 basis points higher and all other variables were held constant, reported profit before tax for the year would increase by \$65,000 (2022: \$57,000).

Credit risk management

The financial instruments which expose the Group to credit risk are principally bank balances, short-term investments and accounts receivable. The Group monitors credit risk on an ongoing basis.

Bank balances and short-term investments are held with New Zealand

registered banks in accordance with the Group's treasury policy.

No collateral is held by the Group in respect of bank balances, short-term investments or accounts receivable. The maximum exposure to credit risk is represented by the carrying value of each financial asset in the Statement of Financial Position.

Liquidity risk

The Group manages liquidity risk by maintaining adequate reserves, cash deposits and short-term investments, by monitoring forecast and actual cash flows and matching the maturity profiles of financial assets and liabilities, all of which are of a short-term nature. The Group continues to generate sufficient cash flows from operations to meet financial liabilities.

15. COMMITMENTS

Non-cancellable operating lease commitments

The Group has reviewed its lease commitments in light of NZ IFRS 16 *Leases* and has determined that there are none which meet the criteria set out in the standard to be recognised as Right of Use Assets in accordance with that standard.

Leases are classified as finance leases whenever the terms of the lease transfer a significant portion of all of the risks and rewards of ownership to the lessee. All other leases are classified as operating leases.

The Group has no leases which would be classified as finance leases.

Operating lease payments are recognised on a systematic basis representing the pattern in which economic benefits from the leased asset are consumed over the lease term.

<i>in thousands of New Zealand dollars</i>	2023	2022
Within one year	191	159
Between one and five years	74	82
Over five years	3	7
Total non-cancellable operating lease commitments	268	248

16. LEGAL LIABILITY

In December 2020, WorkSafe laid two charges against GNS Science under the Health and Safety at Work Act 2015 (HSWA) relating to the 2019 eruption on Whakaari/White Island. The first charge against GNS Science has been dismissed by the Court. In May, GNS Science reached agreement with WorkSafe for early resolution of the second charge. This has resulted in GNS Science pleading guilty to a reduced charge under section 49 of HSWA 2015. GNS Science is waiting for a sentencing date in respect of the second charge which has a maximum penalty of \$500,000. GNS Science accrued for the penalty based on the probable outcome as discussed with the Legal representative.

(2022: \$nil disclosure).

17. EVENTS AFTER THE BALANCE DATE

GNS Science is waiting for a sentencing date in respect of the 2019 eruption on Whakaari/White Island at which the Court will confirm the penalty for payment.

18. PREPARATION DISCLOSURES

Statement of compliance

The financial statements have been prepared in accordance with New Zealand generally accepted accounting practice. They comply with New Zealand equivalents to International Financial Reporting Standards and other applicable Financial Reporting Standards, as appropriate for profit-oriented entities. The financial statements also comply with International Financial Reporting Standards.

Accounting policies have been applied consistently to all periods presented in the financial statements, as the Group determined that it has no material lease commitments that comply with the criteria set out in the standard.

Measurement basis

The financial statements of the Group have been prepared on a historical cost basis, except that derivative financial instruments are measured at their fair value.

Transactions in foreign currencies are converted at the New Zealand rate of exchange ruling on the date of the transaction. Monetary assets and liabilities at year end are converted to New Zealand dollars at the exchange rate ruling at balance date.

The financial statements are presented in New Zealand dollars which is the Group's functional currency. All values are rounded to the nearest thousand dollars.

Interest in joint arrangements

A joint arrangement is an arrangement whereby the Parent or its subsidiaries have joint control over an entity. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about the relevant activities of that entity require the unanimous consent of the parties sharing control. A joint arrangement is either a joint operation or a joint venture. For a joint operation the Group recognises its share of assets, liabilities, revenues and expenses on a line-by-line basis using the proportionate method. For a joint venture the Group recognises its interest in a joint venture as an investment and accounts for that investment using the equity method.

Classification of financial assets and liabilities

The Group's financial assets consist of cash and cash equivalents, short-term investments and trade receivables. These are measured at amortised cost. In the case of trade receivables, cost is reduced by an allowance for credit losses for doubtful debts.

The expected credit losses on trade receivables are analysed based on the Group's historical credit loss experience, adjusted for factors that are specific to the debtors, general economic conditions and an assessment of both the current and forecast direction of conditions at the reporting date.

Changes in the assessed value of doubtful debts are provided for as a credit risk allowance. New allowances are recognised in the Statement of Comprehensive Income. When a trade receivable is considered uncollectible, it is written off against the allowance. Subsequent recoveries of amounts previously written off are credited against the allowance.

Financial liabilities, excluding derivative financial instruments, consist of trade and other payables and are initially measured at fair value, net of transaction costs. They are subsequently measured at amortised cost. Derivative financial instruments are measured at fair value.

Critical accounting estimates and judgements

In applying the accounting policies, there is the requirement for judgements, estimates and assumptions to be made about the carrying amounts of some assets and liabilities. The estimates and assumptions are based on historical experience and other relevant factors. Actual results may differ from these estimates.

Accounting policies where critical estimates have been made include property, plant and equipment, intangible assets, recognition of deferred revenue, impairment of assets and liabilities, and employee benefits. Judgement has been applied in determining not to value heritage assets for financial reporting purposes.

New Accounting Standards

There are no standards and interpretations pending which would materially affect the Group Financial Statements.

STATEMENT OF RESPONSIBILITY

The Board is responsible for the preparation of the Group's annual financial statements and for the judgements made in them.

The Board through management is responsible for establishing and maintaining a system of internal control designed to provide reasonable assurances as to the integrity and reliability of the financial reporting.

In the opinion of the Board, the annual financial statements for the financial year ended 30 June 2023 fairly reflect the financial position and operations of GNS Science.

For and on behalf of the Board:



David Smol
Chair
26 September 2023



Wendy Venter
Board member
26 September 2023



INDEPENDENT AUDITOR'S REPORT

The Auditor-General is the auditor of Institute of Geological and Nuclear Sciences Limited Group (the Group). The Auditor-General has appointed me, Silvio Bruinsma, using the staff and resources of Deloitte Limited, to carry out the audit of the financial statements of the Group, on his behalf.

Opinion

We have audited the financial statements of the Group on pages 36 to 51, that comprise the consolidated statement of financial position as at 30 June 2023, the consolidated statement of comprehensive income, consolidated statement of changes in equity and consolidated statement of cash flows for the year ended on that date and the notes to the consolidated financial statements that include accounting policies and other explanatory information.

In our opinion, the consolidated financial statements of the Group:

- present fairly, in all material respects:
 - its financial position as at 30 June 2023; and
 - its financial performance and cash flows for the year then ended; and
- comply with generally accepted accounting practice in New Zealand in accordance with New Zealand Equivalents to International Financial Reporting Standards and International Financial Reporting Standards

Our audit was completed on 26th September 2023. This is the date at which our opinion is expressed.

The basis for our opinion is explained below. In addition, we outline the responsibilities of the Board of Directors and our responsibilities relating to the financial statements, we comment on other information, and we explain our independence.

Basis for our opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the Professional and Ethical Standards and the International Standards on Auditing (New Zealand). Our responsibilities under those standards are further described in the Responsibilities of the auditor section of our report.

We have fulfilled our responsibilities in accordance with the Auditor-General's Auditing Standards.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of the Board of Directors for the financial statements

The Board of Directors is responsible on behalf of the Group for preparing financial statements that are fairly presented and that comply with generally accepted accounting practice in New Zealand.

The Board of Directors is responsible for such internal control as it determines is necessary to enable it to prepare financial statements that are free from material misstatement, whether due to fraud or error.



In preparing the financial statements, the Board of Directors is responsible on behalf of the Group for assessing the Group's ability to continue as a going concern. The Board of Directors is also responsible for disclosing, as applicable, matters related to going concern and using the going concern basis of accounting, unless the Board of Directors has to cease operations, or has no realistic alternative but to do so.

The Board of Directors' responsibilities arise from the Crown Research Institutes Act 1992.

Responsibilities of the auditor for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements, as a whole, are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion.

Reasonable assurance is a high level of assurance, but it is not a guarantee that an audit carried out in accordance with the Auditor-General's Auditing Standards will always detect a material misstatement when it exists. Misstatements are differences or omissions of amounts or disclosures and can arise from fraud or error. Misstatements are considered material if, individually or in the aggregate, they could reasonably be expected to influence the decisions of readers taken on the basis of these financial statements.

For the budget information reported in the financial statements, our procedures were limited to checking that the information agreed to the Group's statement of corporate intent and Board approved budget.

We did not evaluate the security and controls over the electronic publication of the financial statements.

As part of an audit in accordance with the Auditor-General's Auditing Standards, we exercise professional judgement and maintain professional scepticism throughout the audit. Also:

- We identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- We obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances but not for the purpose of expressing an opinion on the effectiveness of the Group's internal control.
- We evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Board of Directors.
- We conclude on the appropriateness of the use of the going concern basis of accounting by the Board of Directors and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- We evaluate the overall presentation, structure and content of the financial statements, including the disclosures and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

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We communicate with the Board of Directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Our responsibilities arise from the Public Audit Act 2001.

Other Information

The Board of Directors is responsible for the other information. The other information comprises the information included on pages 2 to 35, but does not include the financial statements, and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information and we do not express any form of audit opinion or assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information. In doing so, we consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on our work, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Independence

We are independent of the Group in accordance with the independence requirements of the Auditor-General's Auditing Standards, which incorporate the independence requirements of Professional and Ethical Standard 1: *International Code of Ethics for Assurance Practitioners* issued by the New Zealand Auditing and Assurance Standards Board.

Other than the audit, we have no relationship with, or interests in, the Group.



Silvio Bruinsma
Deloitte Limited
On behalf of the Auditor-General
Wellington, New Zealand

DIRECTORY

PRINCIPAL LOCATION AND REGISTERED OFFICE

1 Fairway Drive, Lower Hutt 5010,
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DIRECTORS

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Chair

Dr John Sharpe
Deputy Chair

Felicity Evans

Paul White

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Wendy Venter

Brian Young

Livia Esterhazy

EXECUTIVE LEADERSHIP TEAM

Chelydra Percy
Chief Executive

Dr Gary Wilson
General Manager, Research Strategy
and Partnerships & Chief Scientist

Tania Gerrard
General Manager, Māori and
Stakeholder Relations

Peter Benfell
Interim General Manager,
Business Services

Lucia Roncaglia
Interim General Manager,
Science

Diane Edwards
Interim General Manager,
People and Culture

BANKERS

ANZ

AUDITOR

Silvio Bruinsma
Deloitte Limited
On behalf of the Auditor-General

SOLICITORS

Chapman Tripp

WEBSITES

www.gns.cri.nz
www.geonet.org.nz

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

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SCIENCE PROJECTS
EACH YEAR

40
NATIONALLY
SIGNIFICANT DATABASES
& COLLECTIONS

