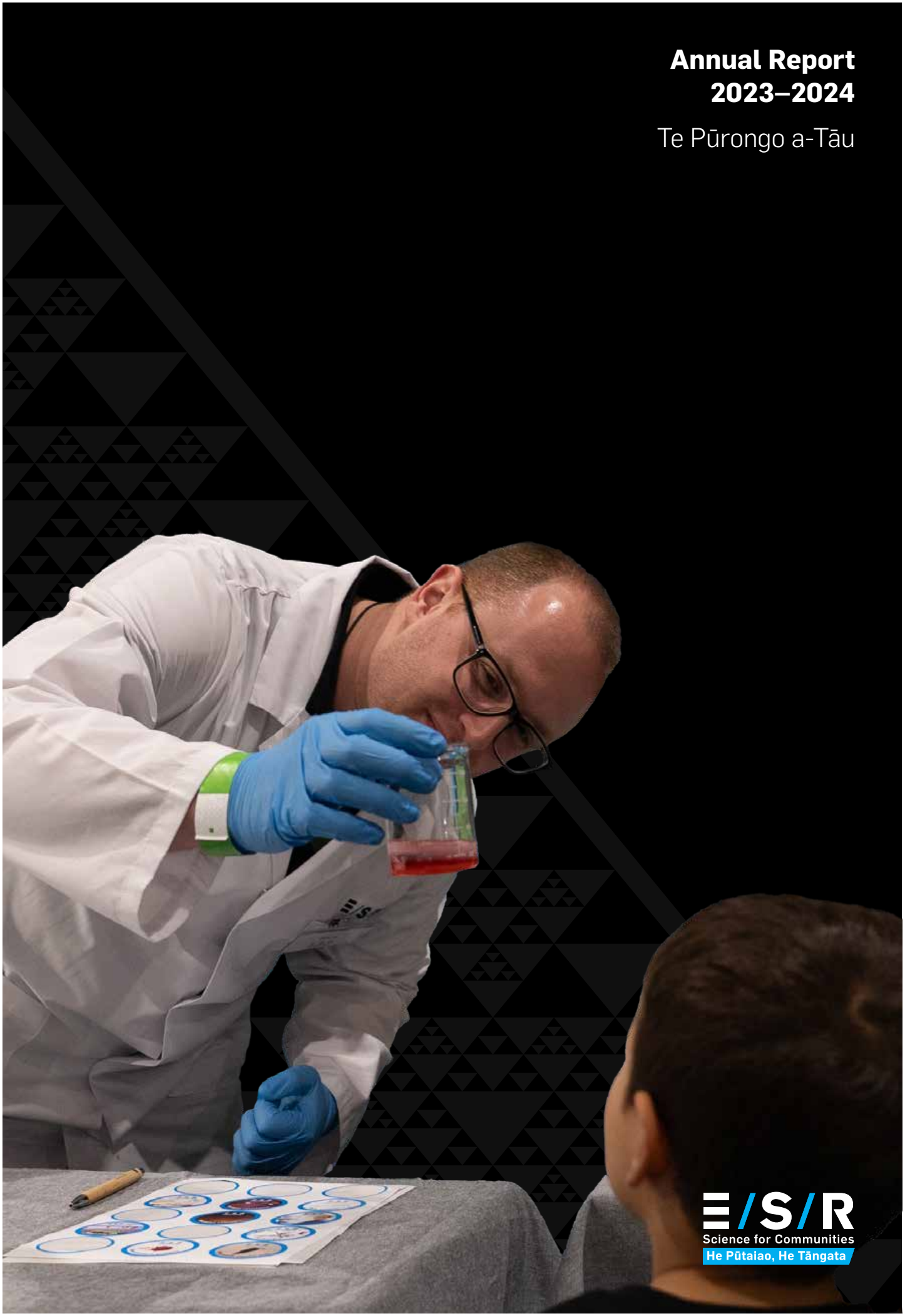
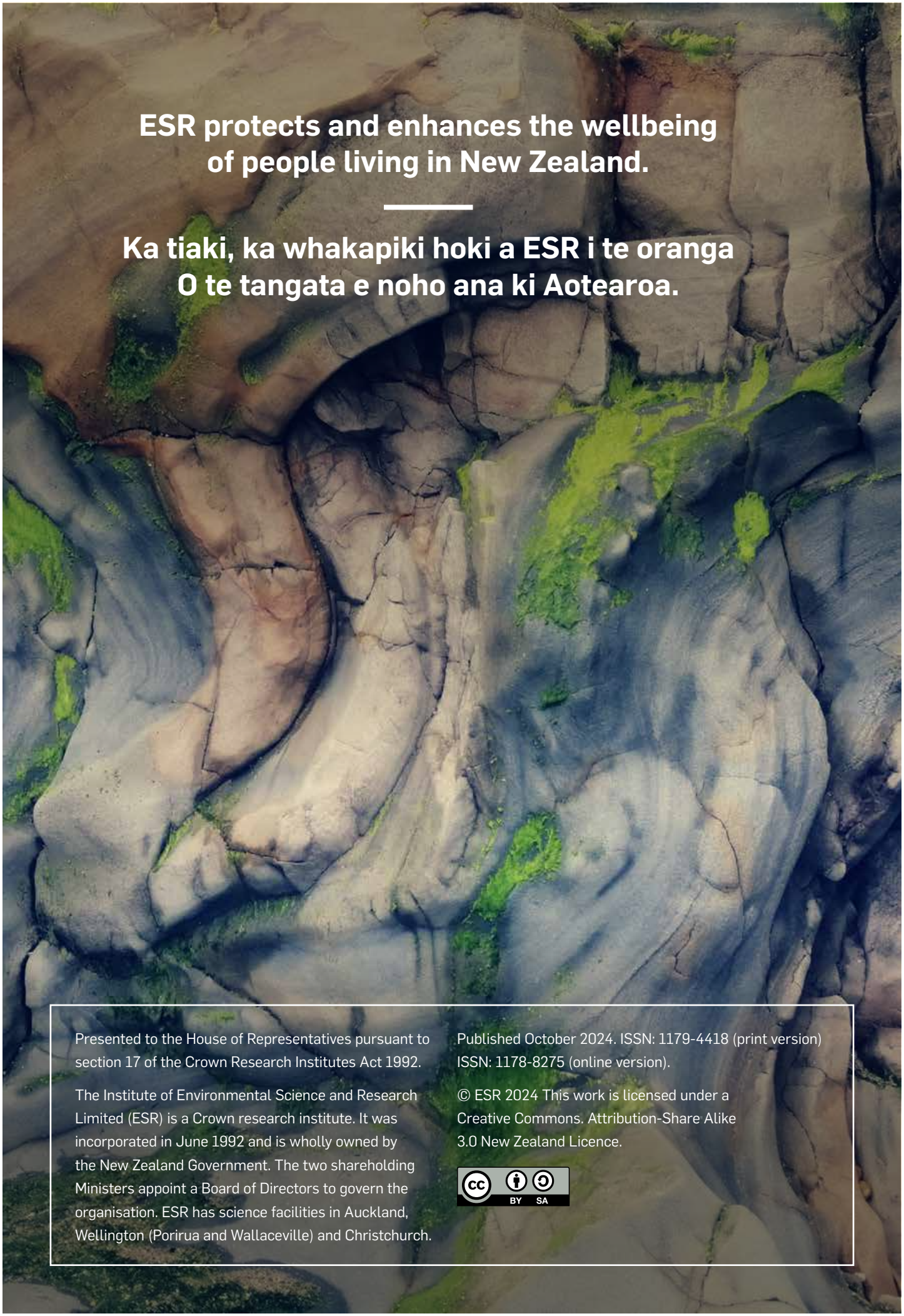
Annual Report 2023–2024

Te Pūrongo a-Tāu



ESR
Science for Communities
He Pūtaiao, He Tāngata



ESR protects and enhances the wellbeing of people living in New Zealand.

Ka tiaki, ka whakapiki hoki a ESR i te oranga O te tangata e noho ana ki Aotearoa.

Presented to the House of Representatives pursuant to section 17 of the Crown Research Institutes Act 1992.

The Institute of Environmental Science and Research Limited (ESR) is a Crown research institute. It was incorporated in June 1992 and is wholly owned by the New Zealand Government. The two shareholding Ministers appoint a Board of Directors to govern the organisation. ESR has science facilities in Auckland, Wellington (Porirua and Wallaceville) and Christchurch.

Published October 2024. ISSN: 1179-4418 (print version) ISSN: 1178-8275 (online version).

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Ngā Ihirangi

Cover photo credit: Discovering Science at the I Love Local expo in Porirua. Source: ESR.

ESR at the Porirua Careers Expo. Source: ESR.

Chair and Chief Executive's overview

Te tirohanga a te Heamana me te Tumu Whakarae

Nāu te rourou, nāku te rourou, ka ora ai te iwi, *with your food basket and my food basket the people will thrive*.

This whakatauki acknowledges the collaboration and strengths-based approach the Institute of Environmental Science and Research (ESR) is taking to support the science and research that underpins public health, forensic science, the environmental impacts of climate change on human health, and the safe use of ionising radiation. In working together with Crown entities, universities, Māori partners and the wider science, innovation and technology sectors, ESR contributes to the improvement of community health and wellbeing in Aotearoa New Zealand.

We are pleased to present ESR's 2023–2024 Annual Report, which documents our results for the year against the objectives set out in our Statement of Corporate Intent 2023–2028.

Our science has continued to deliver genuine impacts for communities. Some key achievements include:

- developing a digital twin to support data science solutions to predict the impacts of future health events
- partnering with Ngāti Toa Rangatira to revitalise Te Awarua-o-Porirua Harbour
- working with Rangiwahio marae to support the development of psilocybin-based[1] therapies using rongoā Māori approaches and practices
- using the Forensic Investigative Genetic Genealogy (FIGG) tool to help the New Zealand Police with long-term cold cases
- contributing valuable data about influenza through WellKiwis (part of the SHIVERS programme of research on influenza), featured in several high impact publications in 2023.

We are extremely proud of the innovative and high-quality work produced by ESR and wish to recognise the commitment and contribution from our people.

Over the year, several of our staff have been acknowledged with national and international awards. We take immense pride in their dedication, spirit and professionalism.

Throughout 2023–2024, our focus remained on ensuring ESR is a robust, people-centred workplace that adapts to evolving individual and organisational needs. This includes shaping our workforce to build capabilities that align with ESR's future needs and those of the wider science system.

Partnering with Māori leadership and mātauranga Māori

Our commitment to Māori partnership in science underscores ESR's desire to connect with Māori leadership and appropriately incorporate mātauranga Māori into the science we deliver. We acknowledge we are still in the early stages of this transformative journey.

We continue to invest in the capabilities of our Māori Impact team and have worked to transform our organisational tikanga and approach to partnering with Māori.

1 Psilocybin research has shown it can treat various mental health conditions, including depression, anxiety and addictions.

Lake Rotoma. Source: ESR.

Through the work of our Māori Impact team, we are dedicated to building enduring inclusion and partnerships with iwi and hapū, ensuring our scientific endeavours provide material and sustainable benefits to these communities.

Increasing the number of Māori in science, technology, engineering, mathematics, and medicine (STEMM) is the cornerstone of our He Ō Uta, He Ō Tai initiative. We have strengthened our partnership with Pūhoro STEMM Academy, aligning strategic and impact outcomes for ESR, Pūhoro, and the broader New Zealand science system.

Science sector reforms – building the future of science

The election of a new Government in October 2023 has seen a refocusing of the science, innovation and technology (SIT) system. Science, innovation and technology are critically important for economic productivity. The Government's review of the science system will potentially affect the current form of all Crown research institutes (CRIs) including ESR. The Science System Advisory Group[2] is focusing on institutions, funding, advanced technology and commercialisation, as well as workforce and connectedness, with government as a commissioner, funder and user of science. This focus is one ESR supports to ensure the best science research and service outcomes for New Zealand.

Ensuring our science is fit-for-purpose and capable of addressing New Zealand's future needs is critical. We are committed to strengthening the science, innovation, and technology sectors by supporting the move towards a knowledge-based, diversified economy.

As part of these efforts, we were delighted to receive shareholder approval to invest in the redevelopment of the Kenepuru Science Centre (KSC). The re-build, currently underway, will create a state-of-the-art facility to support ESR's work on behalf of New Zealand, and provide capacity for the future. It will feature highly flexible laboratory areas for our various sciences, and modern collaborative workspaces to deliver the science our communities need.

2 The Science System Advisory Group established by the Minister of Science, Innovation and Technology provides advice to the government on strengthening the science, innovation and technology system.

Meeting the challenges currently impacting New Zealand

The challenges facing the country are multi-faceted – economic, social, cultural, health, justice and climate-related. We will use our research expertise to assist the government to address these issues and improve community wellbeing.

Maintaining our resilience, creativity, and adaptability is essential for navigating through these periods of change and opportunity. We also work to support our Pacific neighbours to build resilience and capability.

ESR relies primarily on Crown funding, through service-level contracts and research grant funding, to undertake its public-interest science research and delivery. The Board and management anticipated the changing fiscal environment and through an active programme of cost management throughout the year, are pleased to deliver a positive year-end financial result. The Government's Budget 2024 indicated a constrained future fiscal environment, and as an organisation we are facing cost pressures due to inflation.

We recognise and are responsive to the fiscal pressures of our main government contract funders. To continue to deliver effective and efficient services, we are evaluating our organisation to ensure we maintain financial sustainability and the flexibility to pursue our strategic objectives, while managing risk responsibly. We recognise the importance of diversifying and building stronger revenue streams for the years ahead. While exploring avenues for new business funding, we will ensure the quality, security and timeliness of our scientific services are not compromised.

Our commitment remains on ensuring ESR is a world-leading organisation, dedicated to delivering creative and collaborative solutions that enhance health, wellbeing and environment in New Zealand and across the Pacific.

In closing, we extend our sincere gratitude to our partners and stakeholders, especially our iwi and mana whenua partners, for their support to help us deliver better outcomes for New Zealand.

We greatly appreciate the support and cooperation of our shareholding ministers and key funding agencies; the Ministry of Business, Innovation and Employment (MBIE), Ministry of Health, Ministry for Primary Industries, and the New Zealand Police. These vital relationships enable ESR to deliver impact for all New Zealanders, and to be a resilient, well-prepared organisation for the challenges and opportunities that lie ahead.

He maurea kai whiria!

Professor Sarah Young
Board Chair

Sir Ashley Bloomfield KNZM
Interim Chief Executive Officer

Who we are
Ko wai mātou

ESR is the Crown Research Institute with a critical national role in public health and forensic sciences and is a significant contributor to human environment and biosecurity outcomes. ESR provides scientific leadership, policy-ready intelligence and service delivery to support New Zealand's decision-makers. We strengthen community wellbeing and resilience through our science.

By collaborating with top-tier researchers and experts, we address complex issues using a multidisciplinary approach. Our vision is to enhance the wellbeing of New Zealanders through innovating and applying our diagnostic and analytical expertise.

As a science leader, we develop impactful solutions that value mātauranga Māori. We aim to be recognised for Māori-led and co-designed research that builds lasting partnerships and benefits Māori communities.

ESR excels in infectious disease surveillance and solutions. We bolster the nation's pandemic preparedness and contribute to global readiness for future potential outbreaks. Staying at the forefront of genomics science, we benefit the population and economy in the areas of food safety, forensic analysis, antimicrobial resistance and infectious diseases.

We provide cutting-edge forensic science tools to identify and mitigate drug harm, improving public health and justice outcomes. Our research ensures New Zealand's food safety standards meets global requirements, while protecting consumers from unnecessary contamination. We also analyse and ensure the safety of fresh water and groundwater, while promoting environmental health and vitality.

Environmental Microbial Solutions team and collaborators at the Land Treatment Collective Conference.
Source: Sophie van Hamelsveld.

Our expertise also supports the safe use of ionising radiation both locally and internationally through the Pacific.

We work closely with a number of government departments and local bodies, such as the Ministry of Health, the Ministry for Primary Industries, Ministry of Foreign Affairs and Trade, the New Zealand Police, Ministry of Business, Innovation and Employment and, regional and local councils.

As a member of the Pacific community, we look for opportunities to work with Pacific partners to build capability and resilience.

Our thought leadership ensures our science has a positive impact on communities. ESR's expertise lies in connecting, detecting and protecting against health risks. Our specialist expertise, combined with our future-focused approach and successful academic partnerships, continue to showcase ESR's capability to meet New Zealand's future challenges.

We are E/S/R
Science for Communities
He Pūtaiao, He Tāngata

Part A:
Year in review

Te tiro whakatemuri ki te tau

Processing samples for COVID-19 sequencing. Source: ESR.

Highlights
Ngā mahi hira

Over the year, we have continued developing our transformative science, research and delivery capabilities, creating solutions that enhance the wellbeing of New Zealand's people, communities and economy.

Our leadership in research and science service priorities, such as forensic analysis, infectious diseases, antimicrobial resistance and genomics, is recognised across the justice, health, food and water sectors. Here are highlights of our achievements this year.

Advancing our future science

Shareholder approval to invest in the redevelopment of the Kenepuru Science Centre

Communicating our science for impact

- **92 research papers published** (with New Zealand and international collaborators)
- **21** health papers
- **46** environmental papers
- **16** forensic science papers
- **9** computer, food science and social systems papers

ESR showcasing Impact for Māori at the 23rd Triennial Meeting of the International Association of Forensic Sciences. Source: Heidi Baker.

Meeting our sustainability targets

ESR **achieves** sustainability verification

TOITŪ CARBON REDUCE ISO 14064-1 ORGANISATION

Keeping our food safe and supporting exports

19 research projects to support the food industry and New Zealand Food Safety

Testing in ESR's food chemistry laboratory. Source: ESR.

Monitoring trends in infectious disease organisms

- **23,082** microbial samples
- **6,332** bacterial and **16,750** COVID-19 samples

Bacterial culture of *Streptococcus pneumoniae*. Source: ESR.

Building our scientific capability

5 scholarships awarded

Preventing harm in communities

- **More than 107** organisations world-wide using STRmix™ to resolve complex DNA mixtures
- **Improved accuracy** of Lumi® since deployment in 2022, New Zealand Police tested over **10,900 samples**
- **95.8% success rate** of Lumi drug compounds detected

Recognition of ESR's scientific expertise and thought leadership

- **8** national awards received
- **1** international award received
- **4** New Zealand committee appointments
- **8** overseas committee appointments

ESR receiving the Science and Research Award at the Primary Industry New Zealand Summit. Source: Theo Sarris.

Showcasing our science

1,018 media mentions on genomics, infectious disease, public health surveillance, wastewater, forensics and influenza

Examining nematode DNA under the microscope. Source: ESR.

Celebrating our people

Te whakanui i ā mātou kaimahi

Our people are the driving force behind ESR's transformative science. This year, several of our team members received national and international awards and appointments, reflecting their dedication, spirit and professionalism. We are proud of their achievements and outstanding contributions.

ESR has diligently assembled science teams that rank among the world's best, led by top experts in fields such as genomics, bioinformatics, forensics, social science, radiation, epidemiology, virology, drug chemistry and toxicology, environmental science, food safety and data science.

Our people continue to make significant strides in improving public health, forensic science, and environmental outcomes, as evidenced by the following national and international recognitions.

Wellys finalist – Dr Joanne Hewitt. Source: Joanne Hewitt.

ESR's Joanne Hewitt Wellingtonian of the Year finalist

ESR Science Leader Joanne Hewitt was a finalist in **The Post 2023 Wellingtonian of the Year Awards** (The Wellys) in the Science and Technology category, recognising her significant contributions to public health and the impact of her work.

Joanne, part of the Enteric, Environmental, and Food Virology/Norovirus Reference Laboratory, supports the Ministry of Health and works on projects identifying sources of viral outbreaks to inform policy.

The nomination highlighted her research on enteric viruses, including noroviruses and SARS-CoV-2, in the environment, water and foods.

Being a finalist recognises Joanne's significant contributions to public health.

2023 Adelaide Medal for scientific achievement

In November 2023, our STRmix co-developer Dr John Buckleton received the prestigious Adelaide Medal. The medal acknowledges scientific achievement that has had a marked influence on the forensic field internationally. The medal was awarded at the **23rd Triennial Meeting, in conjunction with the 26th Symposium of the Australian and New Zealand Forensic Science Society** in Sydney, Australia.

In addition to his role as co-developer of STRmix, a sophisticated forensic software capable of resolving mixed DNA profiles, John's casework experience covers 33 years in the United States, Australia, the Netherlands, the United Kingdom and New Zealand. During that time, he has examined more than 2,000 cases, testified more than 200 times, and co-authored more than 250 publications in the forensic field.

Honorary Professor Sue Huang received ESR's Lifetime Achievement Award at the Science New Zealand Awards. A virology expert, Sue is recognised internationally for her work against infectious diseases, particularly influenza, which has been crucial in guiding public health policy nationally and internationally, generating ground-breaking knowledge and informing responses to pandemics.

Sue is the Principal Investigator for the SHIVERS (Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance) studies. These studies examine influenza virus transmission and immunity and aim to inform universal influenza vaccine development. Sue is celebrated for her scientific expertise, alongside her generosity and enthusiasm, which she displays in collaborations, media engagements and with community participants.

Charlotte Gilkison received ESR's Early Career Researcher Award at the Science New Zealand Awards for her exceptional work in infectious disease surveillance. Since joining ESR, after completing her Master of Public Health in 2018, she has become a vital member of ESR's Infectious Disease Outbreak Response team.

Charlotte was instrumental in establishing New Zealand's COVID-19 surveillance programme and has developed expertise in leprosy incidence in the Pacific. Her skills were invaluable during the 2019 measles outbreak in New Zealand.

Charlotte was seconded to Health New Zealand – Te Whatu Ora's National Public Health Service (NPHS) to co-create a work programme to improve public health outbreak information systems. Her contributions to ESR's research are substantial, with numerous peer-reviewed publications.

Charlotte's award underscores her significant impact and future in infectious disease surveillance.

ESR's Lumi team received ESR's Team Award at the **Science New Zealand Awards** for developing a revolutionary phone app that helps frontline police instantly identify drug substances. The app uses infrared technology and machine learning algorithms based on over 600,000 scans of drug samples curated by ESR scientists to detect cocaine, ecstasy or methamphetamine.

Lumi utilises a handheld infrared device to detect drugs, sending results via Bluetooth to an officer's phone within seconds. The app compares the sample against a vast database stored in the cloud and provides a dashboard showing regional drug-use trends.

This award highlights Lumi as a world-leading innovation poised to enhance policing and reduce drug harm in communities.

Lumi was also a finalist in the Commercialisation Impact Award at the KiwiNet awards in August 2023.

Sophie van Hamelsveld from our Environmental Microbiology Solutions team attended the 15th HOPE meeting by the Japan Society for the Promotion of Science in Kyoto, Japan, in late February 2024. She was among 100 early-career scientists from Asia, the Pacific and Africa, including five from New Zealand, along with distinguished scientists and Nobel Laureates.

Sophie presented a poster on her recent work with the Kia Whakanui project, which examines the effect of treated wastewater irrigation on soil fungi under mānuka using amplicon sequencing. Her travel was funded by a Catalyst: Leaders fund grant from Te Apārangi.

iPEN Evaluation System Award 2023

The Impact Planning and Evaluation Network (iPEN) includes ESR's Sudesh Sharma, Phil Carter and Sujan Yellagunda, together with colleagues from six other CRIs. The efforts of iPENs to build research impact capacity and capability have been recognised by the Australian Evaluation Society, through the 2023 Excellence in Evaluation Systems Award. This award acknowledges the development of an exemplary integrated evaluation system, which in the case of CRIs is being used to improve the way research is planned and delivered.

Appointments to international science committees

Our experts are regularly appointed to prestigious international science committees, furthering global collaboration and influence in their respective fields. Over the year the following appointments were made, highlighting the dedication and expertise of our team, and affirming ESR's role as a leader in scientific excellence and innovation.

Heidi Baker, Senior Scientist Forensic, appointed to the Forensic Science Queensland Biology Advisory Sub-Committee, Queensland, Australia as an advisor for two years.

Louise Weaver, Technical Lead Microbial Solutions Health and Environment, appointed to the International Society for Subsurface Microbiology, Brussels, Belgium as the president for three years.

Matthew Russell, Science Leader Forensic, appointed to the Clandestine Laboratory Investigating Chemists (CLIC) Association, Salt Lake City, United States of America, as Vice President for one year.

Helena Rattray, Kaipūtaiao Social Scientist Health and Environment, appointed to the National Institute for Women, Mexico. She was the New Zealand representative and a contributor for the panel: Protection of indigenous women and girls' human rights: Contributions to global cooperation (remotely).

Nicola King, Science Leader Health and Environment, appointed to the editorial board of the European Food Safety Authority operating out of Parma, Italy as a remote editor of the Authorities Emerging Risk Newsletter.

Theo Sarris, Manager Water Environment Group, Health and Environment, appointed as a management committee member of the International Association of Hydrogeologists' representing New Zealand for a period of one year.

ESR's showcase at the 2024 Primary Industry New Zealand Summit. Source: Theo Sarris.

Delivering on our strategy
Ko te whakatinana i tā mātau rautaki

ESR provides scientific leadership and generates policy-ready intelligence and service delivery to support some of New Zealand's most critical decisions.

ESR generates research, service delivery and commercial opportunities from recombinant science in the five following domains:

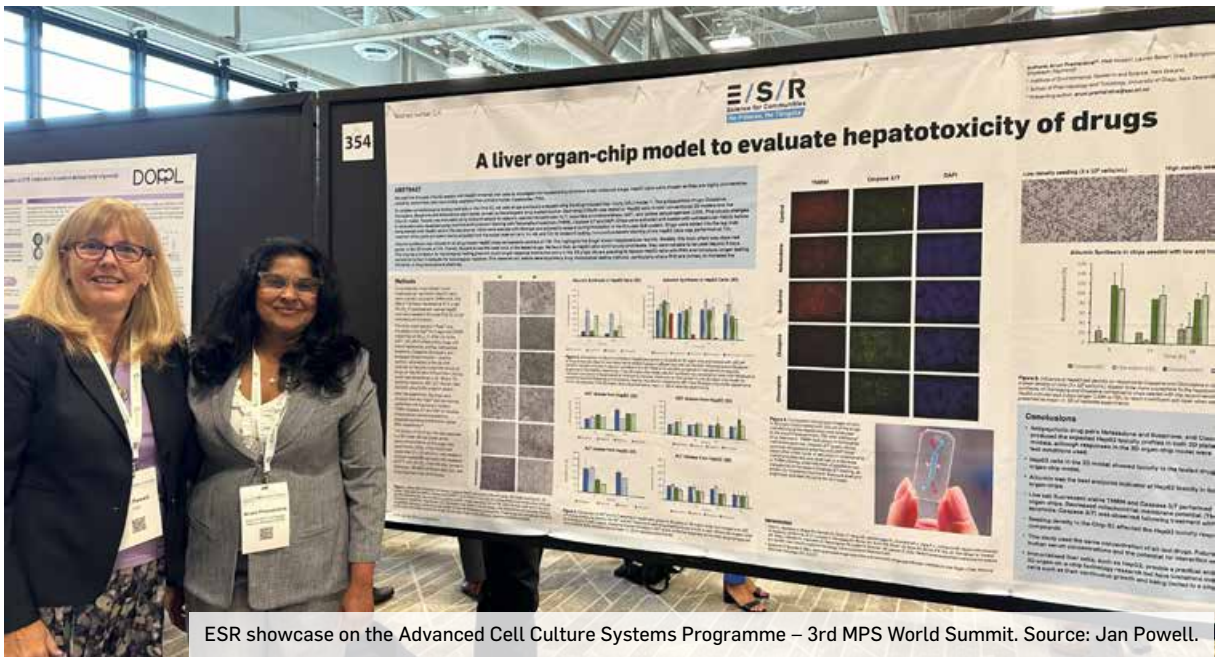
- public health and biosecurity
- forensic sciences related to safety, security and justice
- freshwater and groundwater safety
- food and radiation safety
- impact for Māori.

Our 2023–2028 Statement of Corporate Intent outlines the following objectives and outcomes:

Objectives	Reshaping ESR science to provide integrated thought leadership in the health, environment and justice sectors	Growing sustainable partnerships to provide innovative community-focused science solutions/ commercialisation	Deliver greater impact with and for Māori and to be a leading Te Tiriti-partnered CRI	Recognition as an exemplar of a thriving people-centred workplace	Strengthening business systems and processes to increase efficiency with regards to security, governance and sustainable activities
Outcomes	Increased trust and value in ESR's science and applied research through delivered thought leadership and collaboration	Reduced health, justice and environmental inequities and improved wellbeing for communities through innovation applied community-focused science	Increased Māori partnership, participation, leadership and mātauranga Māori	A thriving people centred workplace that embraces Te Tiriti	Increased long-term organisational and system sustainability and resilience through innovation, collaboration and system security

Our performance against these objectives and outcomes is reported against the following impact areas:

- healthier communities
- safer communities
- safer food
- cleaner and safer water and environment
- impact for Māori.



ESR showcase on the Advanced Cell Culture Systems Programme – 3rd MPS World Summit. Source: Jan Powell.

Making a difference
Te whaihua o ngā mahi

ESR's profile and reputation as a trusted science organisation continues to grow nationally and internationally through the delivery of comprehensive and connected science solutions.

We do this by supporting integrated and balanced research programmes, projects and services that continuously improve ESR's science quality and thought leadership. This is underpinned by increased use of technology and a focus on growing knowledge transfer. This leads to strengthened collaboration that enables the development of innovative science solutions for communities and increasing long-term resilience and sustainability for both ESR and the wider Science, Innovation and Technology (SIT) system.

Advancing our science

ESR works across a range of science areas critical for the safety and wellbeing of New Zealanders.

In order to strengthen our science capability, and the science system in New Zealand, we continue to build our leadership, expertise and technology across all of these disciplines.

The questions we are addressing are complex, and we cannot achieve this alone. Through collaboration and innovation, we are committed to expanding the impact science can have for New Zealand.

Generating greater thought leadership and collaboration

ESR's commitment to thought leadership and collaboration with our partners are foundational for meeting our strategic aims, and this is reflected in a number of our programmes.

A key area where ESR provides thought leadership relates to the surveillance of vaccine preventable diseases and the impact on vaccine policy. For example, we are monitoring invasive pneumococcal disease surveillance and reviewing the accompanying work to change the vaccines to cover serogroup 19A[3].

3 Serogroup 19A is a classification within the broader family of *Streptococcus pneumoniae* bacteria, commonly known as pneumococcus. *Streptococcus pneumoniae* is responsible for various infections, including pneumonia, meningitis, and sepsis.

This has supported our efforts in transitioning to genome sequencing for the typing of the pathogen. We are also involved with the ongoing surveillance of Group A streptococci, including a collaboration with the University of Auckland on a new vaccine, highlighting the importance of genomics in surveillance.

ESR's leading role in the artificial intelligence (AI) space, and our strong relationships with national and international universities, enables us to collaborate with top minds and address the challenges facing New Zealand in robust and innovative ways. This is further supported by ESR's work in nurturing the next generation of data scientists directly through the supervision of postgraduate students. In addition, by openly sharing our insights through the presentation of public lectures, webinars and events, we promote the safe and responsible use of AI and emerging technologies.

ESR's collaborations extend beyond New Zealand's borders. In partnership with the New Zealand Ministry of Foreign Affairs and Trade (MFAT) and the International Atomic Energy Agency. ESR's National Centre for Radiation Science (NCRS) has supported radiological safety training, monitoring, emergency preparedness and response initiatives across the Asia-Pacific region and the Caribbean. These efforts have strengthened international ties and enhanced regional radiological safety and security.

Through the Ministry of Health's Office of Radiation Safety, ESR has provided technical guidance and advice to enable the safe application of new therapeutics for the diagnosis and treatment of cancers. Additionally, we continue to support the development of mobile radiology facilities that will be able to better serve communities outside the main metropolitan centres. Our aim is to provide expertise to support industry growth and enhance public health outcomes.

NCRS manages three monitoring stations as part of the Comprehensive Nuclear-Test-Ban Treaty Organization network, contributing to global efforts in monitoring and verifying compliance with nuclear non-proliferation treaties.

ESR's Pacific Environment and Health team continued delivery of the MFAT-funded development project '*Building Resilient Systems – Improving water department integrated water resource management: Tonga water sector and strategy development.*' The project is co-developing the first Tongan national water sector plan and information system.

Working with multiple ministries across the Tongan Government, regional and national NGOs and civil society organisations, ESR is developing a whole-of-system water sector plan, involving water resource security, supply, waste management and environmental impact. This includes developing the Tongan national water resource information management system, which will provide data collection, and information availability across stakeholders for operational and strategic planning and decision-making. The project will contribute to increased climate change and environmental resilience for the economic, health and social wellbeing for Tonga. Similar work is being conducted with country partners in Kiribati and Palau.

ESR's Pacific Environment and Health team are also involved in a multi-CRI collaborative initiative between the South Pacific community, the National Institute of Water and Atmospheric Research (NIWA), Manaaki Whenua – Landcare Research and Geological Nuclear Sciences (GNS) funded by MFAT. This work is looking at environmental exposure in the Pacific and aims to enhance the resilience of Pacific countries to water-related emergencies through provision of robust data and tools to anticipate and respond to climate change events.

Locally, another community-based project showing great promise is ESR's work with Rangiwaho Marae to develop psychedelic rongoā Māori practices. This is a transformative community-led initiative aiming to support iwi, hapū and whānau Māori suffering from methamphetamine use disorder in the Te Tairāwhiti region. It is a collaborative programme of work defined, led and directed by Ngāi Tāmanuhiri Whareongaonga 4 (Rangiwaho Marae) Trustees, in partnership with ESR, Manaaki Whenua – Landcare Research, IO Limited, Tūranga Health, Mātai Research Institute, Rua Bioscience, NZ Drug Foundation, and the University of Auckland.

This year ESR continued to support the project by providing scientific knowledge and understanding of indigenous *Psilocybe* mushroom species. Specifically, we are developing qualitative and quantitative methods to reliably detect compounds of interest. Work is now

beginning on data collection and investigation into the content of the compounds in each species, as well as the distribution throughout each mushroom and their various growth stages. This information will be used to support the cultivation of each species and guide the decisions regarding their clinical use.

Innovation and commercialisation

Over the past year, we have continued to strengthen work on our commercial science pathways. Our activities have included boosting ESR's commercial infrastructure relating to STRmix and Lumi, as well as developing a pipeline of innovative products based on current research underway.

ESR is making progress on organ-on-a-chip development. Our investments in Advanced Cell System using the Emulate organ-on-a-chip technology are enabling our continued focus on building capability around predicative toxicology and pre-clinical testing.

We are currently developing three chip systems – liver, intestinal and lung chips. Work underway includes investigations into fatty liver disease using the liver chip and using the lung chip to investigate the impact of vaping and synthetic cannabinoids, while a recently approved Strategic Science Investment Fund (SSIF) project will look at pathogenesis within the intestinal chip.

By developing these systems, ESR is growing its multi-omics[4] capabilities, while laying the foundation for potential commercialisation of these in the drug, hazardous substances and pharmaceutical testing areas.

Over the past year, ESR has continued to invest in STRmix and Lumi as its key forensic tools. We increased the range of STRmix products to decode complex DNA, with a new release v2.11 notified to clients in September 2023, before being implemented in November. This was followed by an update to the DBLR™ (database likelihood ratios) tool. When used in conjunction with STRmix, DBLR enables forensic laboratories to speed up database searches, visualize the value of DNA mixture evidence, and carry out mixture-to-mixture matches to determine if there is a commonality between samples, while evaluating for family relationships. DBLR v1.4 was flagged for release June 2024 and is now fully operational. For Lumi, we are working on expansion into new markets while further enhancing its capabilities. This new capability involves creation of new firmware and equipment and is expected to be available by the end 2024.

Scientists of the future

ESR's recently established Early Career Group has enjoyed ongoing success this year. This initiative is driven by **Science New Zealand** who has worked with other Crown Research Institutes, including Plant and Food, GNS, NIWA, Manaaki Whenua – Landcare Research, Scion, and Callaghan Innovation to develop Early Career Groups.

The main purpose of ESR's Early Career Group is to develop a community at ESR for those near the beginning of their careers, so they can share ideas, expertise, provide career support, discuss relevant issues, create opportunities for professional and personal development, career progression and networking within ESR and other CRIs. Early career is not defined by factors such as age, level of educational training or work experience, and encompasses anyone who identifies themselves as early career.

The Early Career Group encourages members to get involved and organise local events at each ESR site. Each site group drives their own meet ups, workshops and events, allowing them to choose how often they meet and what the focus of meetings will be, and what initiatives to engage in. The aim is to create a positive, innovative and ambitious network of early career staff and students at ESR, while contributing to the wider growth of skills across the science and technology sector.

Healthier communities

As part of its role to support healthier communities, ESR provides services to identify, prevent and control communicable diseases and other significant emerging public health threats. These services include:

- population monitoring based on disease notifications, testing and surveys

4 Multi-omics involves integrating various "omics" fields—such as the genome, epigenome, transcriptome, and proteome. Examining each layer individually provides only a partial view. However, by combining these diverse layers of biological data, we can create a more comprehensive understanding of human biology and disease.

WellKiwis research programme. Source: WellKiwis

- early warning systems for the health sector and communities
- outbreak and emergency response and pandemic preparedness
- robust, timely evidence and expert technical advice to support public health planning
- health information systems and services for data acquisition, management, integration and enablement
- specialist diagnostic national lead laboratory services
- general services that improve, promote and protect environmental public health.

Each listed area draws on multiple data sources, including laboratory testing, data interpretation, analysis and contextualisation of results, to support and inform public health planning and response. As a result of COVID-19, ESR continues to monitor and assess the risk surrounding new potential viral epidemics using new techniques and technology.

SHIVERS and WellKiwis

The world-leading SHIVERS[5] research programme continues to go from strength to strength after marking its 12th anniversary in 2023. SHIVERS was established by and continues to be run by ESR as a research programme which attracts funding from numerous sources.

The first SHIVERS study was funded by the US-CDC and led to ESR's subsequent SHIVERS-II, III, IV (WellKiwis infant, adult and household cohort) studies in the US National Institute of Allergy and Infectious Diseases (NIAID)-funded DIVINCI[6] and CEIRR[7] research networks.

The CEIRR network comprises seven US-based centres, with each centre supporting multiple research projects both domestically and globally. ESR is part of the St Jude Children's Research Hospital centre, which is made up of seven subrecipient sites outside the US, including New Zealand, Hong Kong, Singapore, Chile, Colombia, Egypt/Lebanon and Israel.

Being part of the CEIRR network is beneficial for ESR on several levels. It enables our researchers to grow our international influence by engaging with other experts and participating in collaborative studies globally. It showcases New Zealand as a unique surveillance site and provides funding valued at more than NZ$13.6 million over seven years. Since 2017, SHIVERS and WellKiwis research has attracted funding from a range of sources totalling close to NZ$34 million.

The WellKiwis cohort studies also continued another year of surveillance and research in adults, children and households residing in the Wellington region. The value of the cohort data and samples continue to attract international interest, with samples from WellKiwis participants before, during and after the COVID-19 pandemic providing a rare historic opportunity to understand influenza immunity comprehensively and its impact on influenza transmission and severity.

A successful year for WellKiwis was acknowledged with the research led by ESR's Senior Science Leader Sue Huang and her collaborators being published in two high impact journals. The SHIVERS/WellKiwis researchers generated new knowledge that immune cells present in people six months before flu infection could more accurately predict if an individual would develop symptoms. The researchers also showcased New Zealand's surveillance and research systems, which documented the reduction of influenza, respiratory syncytial virus and other common respiratory viruses after the implementation of New Zealand's COVID-19 elimination strategies.

5 Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance.

6 Diverse Viruses, Immunity, and Vaccines Network for Community Impact.

7 Centers of Excellence for Influenza Research and Response.

SHOWCASE

Canadian geese at Lake Tekapo. Source: AdobeStock.

Genomics research to boost New Zealand's defences against bird flu

Scientists are collecting samples, such as bird faeces in a research project aimed at understanding how and where avian influenza and other potentially devastating viruses could impact New Zealand as the highly infectious H5N1 spreads globally.

This Te Niwha-funded research project is led by Dr David Winter from ESR and Professor Jemma Geoghegan from the University of Otago, in partnership with local communities and iwi. The research team is working to develop a portable in-field environmental DNA (eDNA) detection tool for bird flu and other viruses as part of an enhanced nationwide surveillance system.

The role wild aquatic birds play in the transmission of viruses, and how this may impact human and animal health in the near future, is unclear. This knowledge gap leaves New Zealand vulnerable to the introduction of a highly pathogenic avian influenza virus with its inevitable impacts on wildlife, agriculture and potentially human health.

"A lot was learnt about using genomics and wastewater during the COVID-19 pandemic and this project will apply relevant knowledge and techniques to better monitor viruses such as influenza and how they are changing," says Dr Winter.

One important lesson from the pandemic was to be prepared, says Dr Winter, who explains ESR's genome sequencing machines were not initially envisaged for use with the novel coronavirus, but were quickly adapted for the purpose.

While the study has a focus on avian flu, the tools developed by the project team aim to detect other viruses too. The influenza surveillance project involves collaborations with organisations government agencies, Crown Research Institutes, local and international universities, as well as communities and iwi.

Te Niwha research platform

Te Niwha is the infectious diseases research platform, which aims to ensure New Zealand has world class research capability to maintain our preparedness for future infectious disease outbreaks.

Over the past year the Te Niwha platform co-hosts, ESR and University of Otago, have worked with the Te Niwha Directorate to enable the infectious diseases research platform to:

- build and co-ordinate domestic research capability in infectious diseases
- continue to address COVID-19 and other serious infectious diseases in New Zealand
- improve preparedness for future pandemics.
- support New Zealand's Health Research Strategy and infectious diseases work with key stakeholders and Māori as Treaty partners, and
- link with international research.

Te Niwha provides a comprehensive approach to infectious disease research and response in New Zealand, focusing on partnership and collaboration with Māori and our most vulnerable communities. Over the past 12 months, Te Niwha researchers have worked alongside Māori and Pasifika communities and health organisations to boost childhood immunisation rates for the most vulnerable.

Another area of Te Niwha-supported research is the increasing risk of avian influenza arriving in New Zealand. To provide more information on the issue, a webinar was hosted in May 2024 with lead researchers providing expert information on the virus, surveillance, research activities, and how New Zealand is preparing for an animal or human case.

As a new operating model, there have been significant learnings with Te Niwha since its inception in 2022. To ensure Te Niwha is designed to deliver maximum impact, the co-hosts have recently initiated a review of the platform model.

New technology impacts delivering innovative science solutions

In the past year, ESR's data science practice has established itself as the fourth science domain alongside forensic science, health, and environment. Our investment in this discipline underscores our commitment to advancing scientific frontiers and responsibly delivering impactful solutions for Aotearoa.

At the forefront of our innovation work is our AI-powered digital twin platform, enabling experimentation into the future and what-if analyses. This capability is applicable across numerous domains and helps us understand complex systems in unprecedented ways. It has brought in new revenue from private organisations and will open up new opportunities across the public sector.

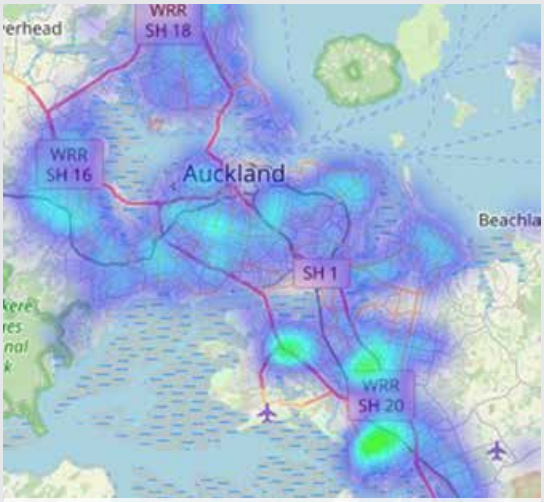
In collaboration with Durham University and the Massachusetts Institute of Technology (MIT), ESR has developed a large population model providing a virtual replica of New Zealand.

This model is crucial for understanding the spread of infectious diseases and evaluating intervention effectiveness. In conjunction with the Public Health Agency and Health New Zealand – Te Whatu Ora, we are using this tool to assess the impact of a measles outbreak, given current vaccination rates, while modelling the effectiveness of interventions. A separate model enables us to forecast COVID-19 hospitalisations up to a month out, thereby providing crucial insights for public health officials to plan hospital capacity in advance of peaks.

ESR's data science initiatives are also being used to help our Pacific neighbours, as we support the nations of Tonga and Palau with water security and health outcomes. To date we have built data hubs that consolidate fragmented local data. These hubs form the foundation for ongoing modelling and the development of interactive tools for local decision-makers, enabling them to gain the insights and make informed decisions for their futures.

Critical to the success of our work is the performance of the computational science team, and the on premise, high-performance computer facility, which enables us to train and run our models securely. Further assurance is provided through being a signatory to the Algorithm Charter of Aotearoa New Zealand and developing and maintaining a Responsible AI Framework.

SHOWCASE



Heat map of modeled infected households. Source: ESR.

Measles disease outbreak modelling

ESR's data science team was commissioned by the Public Health Agency to study measles outbreak scenarios across New Zealand. Large population models, developed in collaboration with international institutions such as Durham University and MIT, are a cutting-edge technique that harnesses advanced neural network architectures to represent traditional agent-based models, with unprecedented accuracy and scale.

At the heart of this innovation is ESR's development of a sophisticated synthetic population model. This method integrates vast amounts of social and health data from various government agencies to accurately represent over five million individuals in New Zealand. The technique has gained international recognition, with ESR's collaborators now applying it to create synthetic populations for major global cities like New York and London.

The model incorporates a state-of-the-art coupling system, combining a time-step based Graph Neural Network and a Long Short-Term Memory network. This powerful integration enables effective simulation of infectious disease spread within communities, offering unparalleled insights into the potential impacts of measles immunisation across different New Zealand communities. The technique allows us to experiment with different immunisation responses, study the impact of targeting different demographic groups, and explore the impact of outbreaks across various regions of New Zealand.

By leveraging these advanced AI techniques and fostering international collaborations, ESR is not only enhancing New Zealand's preparedness for potential measles outbreaks, but also positioning itself at the forefront of predictive epidemiology on a global scale. This work exemplifies our data science team's commitment to using world-leading science to safeguard public health while contributing to the advancement of AI-driven population modelling worldwide.

Safer communities

ESR delivers science and services that help monitor and reduce drug harm, support the justice system and ensure the use of ionised radiation and levels in the environment is safe.

With respect to drug identification, we have continued to develop the portable drug scanning tool, Lumi to achieve higher detection reliability and ability to detect a broader range of drugs as part of roadside drug intervention.

At a community level, ESR is supporting drug checking in New Zealand with a focus on applying world-leading science to reduce drug-related harm in our communities. Drug checking services are free and confidential to use, allowing members of the public to have a drug sample analysed to indicate its likely composition. New Zealand was the first country to legalise drug checking services in 2021, with the aim of reducing risk and harm by helping people make informed decisions about drug use. It does not promote illicit drug use or claim that illicit drug use is safe.

Services are provided through Drug Information and Alerts Aotearoa New Zealand, whose work is supported by a network of health professionals and social services, including ESR. The KnowYourStuff tents at summer festivals, such as Twisted Frequency and Splore, are examples of where this service is being offered directly to the public.

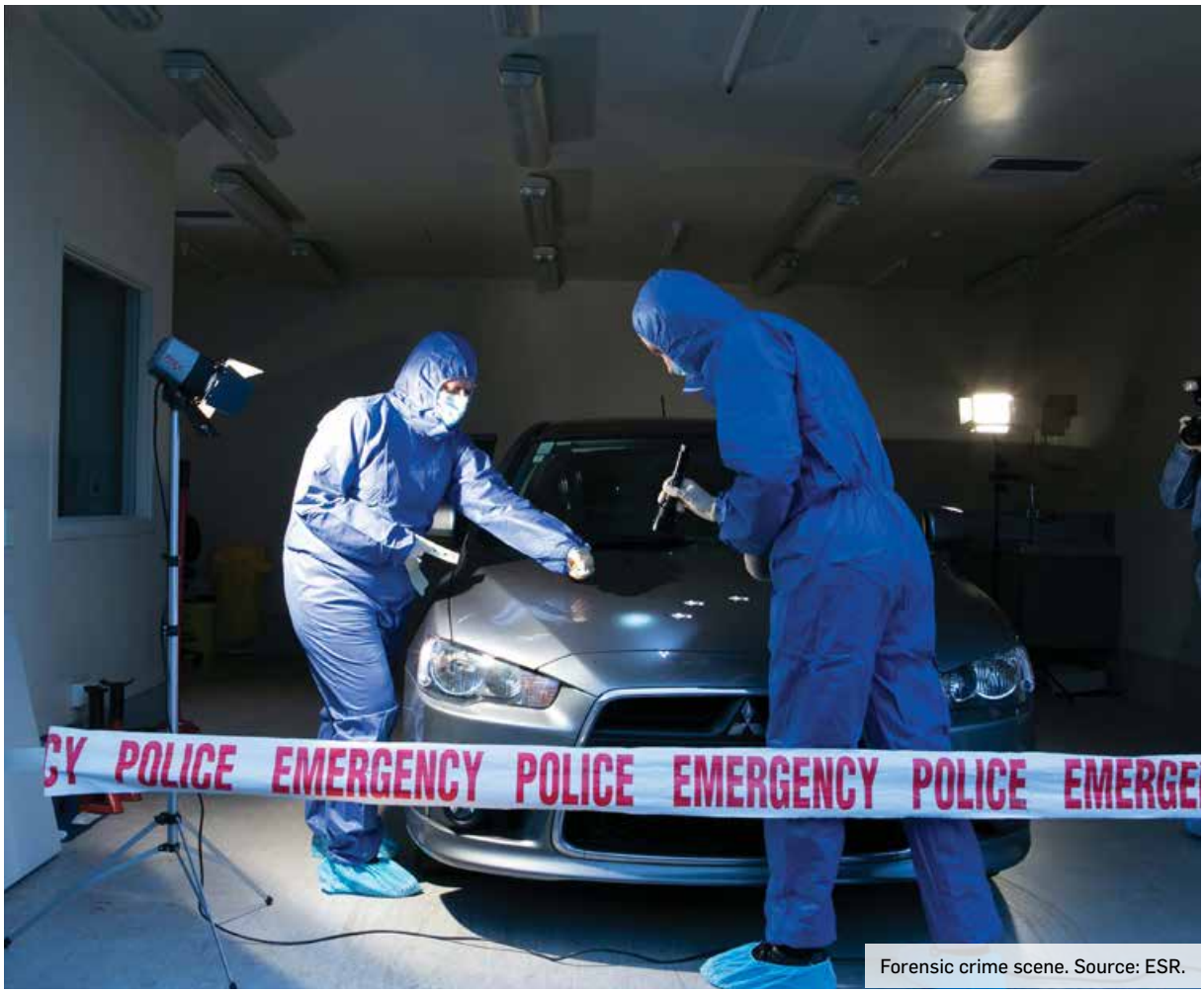
ESR's role involves provision of scientific advice and laboratory analysis of samples that are difficult to identify, associated with harm, or where further investigation is required. ESR works collaboratively with the drug checking providers and with High Alert, New Zealand's drug early warning system, to support efforts to alert the public to potentially harmful drug trends. We utilise our knowledge of international trends to identify novel drugs and then work with High Alert and the drug checking providers to get this information into the community.

Within the justice system, ESR continued to deliver forensic services to the New Zealand Police, New Zealand Customs Service, and the Ministry of Health. Over the past year, ESR began collaborating with the police using the Forensic Investigative Genetic Genealogy (FIGG) tool to help with serious cold cases.

FIGG combines DNA testing with genealogical research to analyse genetic relationships between individuals who share very small amounts of inherited DNA with the crime scene sample. It uses genealogy databases and publicly available records to help with cold cases and identify human remains. ESR completes sample testing as part of its forensic services to the police and in doing so, provides the assurance that all sample testing is completed in New Zealand.

This ensures only extractions of the digital genetic code are provided to third-party international service providers, with no actual DNA material being sent outside of New Zealand.

Through ongoing development and further improvements to our STRmix product, we continue to provide world leading solutions to complex DNA mixtures to support justice systems in New Zealand and around the world.



Forensic crime scene. Source: ESR.

SHOWCASE

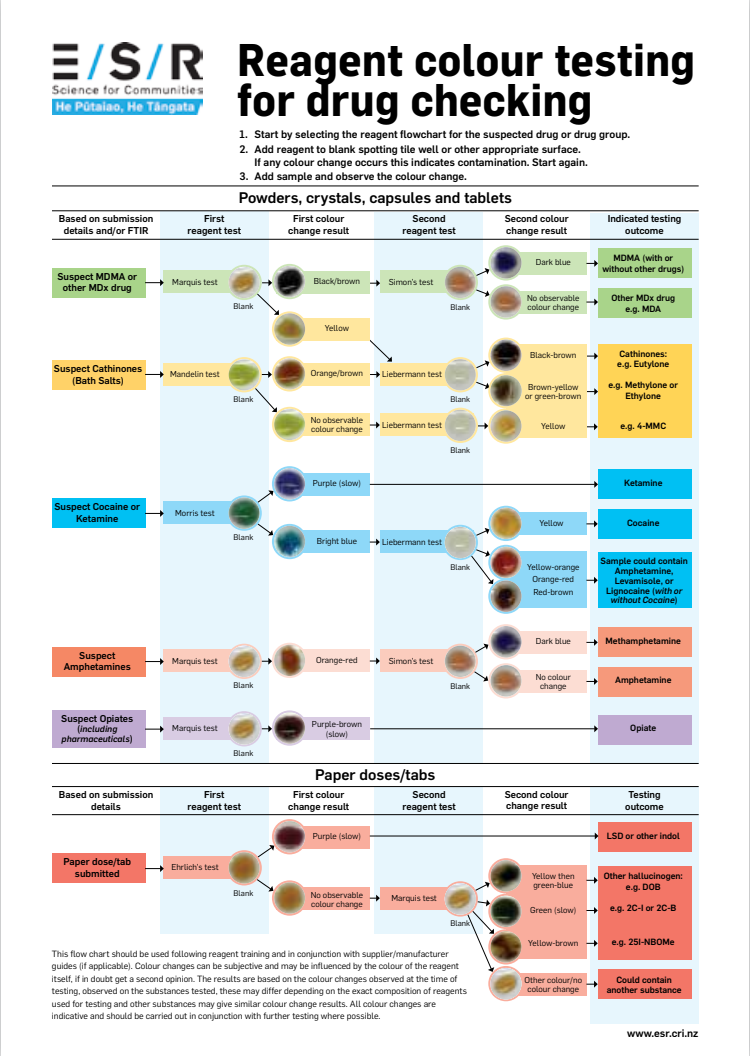
Drug checking in the community

In-field drug checking utilises rapid testing methods, such as reagent colour tests and portable spectroscopy to collect a chemical fingerprint of the sample and compare it to an extensive chemical library. These techniques are quick to use, portable for in-field analysis, and provide reliable results.

ESR is responsible for maintaining the portable testing instruments. In advance of the 2023–2024 summer season, ESR co-ordinated the purchase and implementation of two additional instruments. There are now six Health New Zealand – Te Whatu Ora-funded instruments available to drug checking providers, significantly increasing the overall capacity of the service.

In April 2024, ESR analysed a sample of concern through a drug checking clinic conducted by Drug Injecting Services Canterbury. The tablet contained a highly potent synthetic opioid, N-Desethyletonitazene. This was the first time this nitazene-type drug had been detected in New Zealand, and international data suggests it may have a potency similar or greater than fentanyl. Following a High Alert notification to the public regarding the newly detected drug, ESR was requested to urgently complete an investigation into the utility of nitazene test strips in drug checking clinics. This allowed for the approval of this technology, enabling drug checking services to access nitazene test strips to screen for these types of substances in the community.

ESR has also manufactured chemical colour testing reagents for use at drug checking clinics across the country. This is a new commercial product for ESR, utilising our scientific experience to provide drug checking services with a reliable source of colour tests.



Radiation monitoring. Source: ESR.

Safe and secure use of ionising radiation

NCRS has been pivotal in providing technical radiation safety and security expertise to the Ministry of Health. ESR provides technical advice to the Office of Radiation Safety, as required, for example radiation safety advice around new theranostic[8] treatments. The Office of Radiation Safety performs regulatory functions, including on-site inspections of medical and industrial applications of ionising radiation. Additionally, our emergency preparedness and response services, including twenty-four seven on-call radiological emergency duty officers, have been instrumental in safeguarding public health.

This year we worked on research relating to residential and workplace radon gas exposure. Understanding and mitigating radon-related health risks is a priority, as radon is a significant contributor to lung cancer. By mapping radon levels across New Zealand, and correlating these with health outcomes, NCRS aims to provide critical insights to inform public health policies and interventions.

This research exemplifies our commitment to advancing knowledge in environmental health and protecting our communities from radiation hazards.

Our environmental initiatives, such as the development of passive seawater sampling methods, will aid in monitoring the global transport of radionuclides in marine ecosystems. Establishing a seawater monitoring network across the Pacific region will produce valuable data to support our regional partners, who have growing concerns relating to the Fukushima Daiichi treated water discharge.

NCRS has also provided support to the justice system through the Environment Court, offering expert input for a mining and mineral processing resource consent application, to ensure appropriate environmental and public health safeguards are put in place.

Safer food

Food safety is a key area where our science makes a positive impact for human health. ESR works closely with the Ministry for Primary Industries via New Zealand Food Safety and the food industry in general, to deliver testing and surveillance for the organisms that jeopardise the safe production and consumption of food and food products.

By using whole genome sequencing (WGS), ESR is able to better understand sources and transmission pathways of foodborne pathogens. An example area of focus this year was a Health and Research Council-funded study on yersiniosis – a gastro-intestinal disease predominately caused by the bacteria *Yersinia enterocolitica.* This disease has increased dramatically in New Zealand over recent years, with 1,408 notified cases reported in 2023.

The use of WGS techniques, alongside food sampling and a case control study, identified pork as a significant risk factor for the types of *Y.enterocolitica* causing the most yersiniosis in New Zealand. The study succeeded in providing robust evidence for New Zealand Food Safety to focus their investigations at the pork primary processing level. The implementation of intervention strategies at processing, together with improved consumer level education will see the reduced incidence and public health burden of yersiniosis in New Zealand.

The importance of food safety is not limited to food processing activities. Environmental impacts from events such as Cyclone Gabrielle can affect food safety and production in ways not typically expected. An example of this is highlighted in the following showcase.

8 Theranostics is a personalised treatment combining diagnostics and therapies to detect and treat a range of cancers.

SHOWCASE

Buried apple orchard – Cyclone Gabrielle. Source: Adobe Stock.

Microbiological food safety risks associated with flood-affected soils

Cyclone Gabrielle devastated New Zealand's horticulture heartland, leaving behind flooded fields and a pressing question: When is it safe to replant? Floodwaters can carry harmful bacteria into the soil and growers were worried these would make new crops unsafe for consumers. Growers needed science-backed guidance, so industry partners of the New Zealand Food Safety Science and Research Centre commissioned ESR to provide the necessary scientific evidence.

Some bacteria are used as indicators there might be a food safety problem. The researchers found little was known about the levels of these in a 'normal' horticulture soil, so how could you know if a soil was unsafe? Testing of some post-flood soils identified other contamination markers to support decision-making. When it came to dangerous bacteria, some die off quickly in soils, but others can linger for weeks or even months.

The type of soil, temperature and moisture levels all influence how long these pathogens survive.

While testing for *E. coli* is helpful, it is not reliable on its own. Other methods, such as identifying genetic markers of human or animal waste, can provide more insight. Based on their findings, ESR scientists suggest waiting at least 60 days after the soils have drained before replanting. Soil sampling methods were also examined, and, with smart sampling and testing, this waiting period might be shortened. Detecting *Listeria* bacteria in the soil is not a good indicator for replanting safety but should prompt extra caution in food processing.

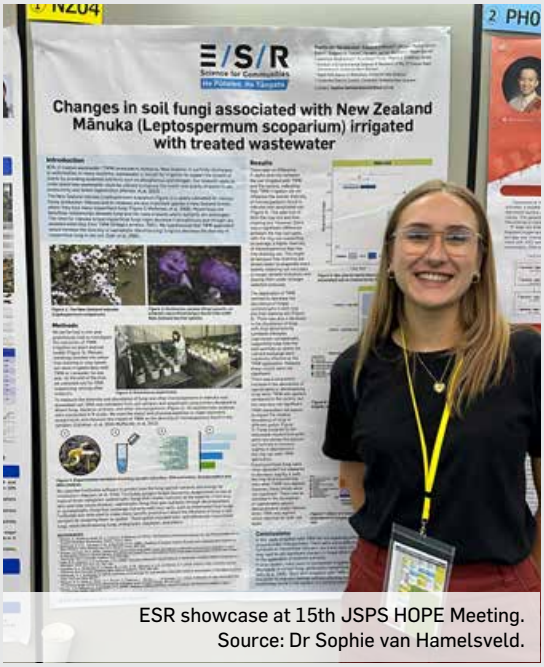
This study provides insights for growers and food safety regulators. It is a step towards ensuring New Zealand's food supply remains safe after future natural disasters.

Cleaner, safer water and environment

Climate change has profound and multifaceted impacts on human health and the availability of clean water. The consequences are both direct and indirect, affecting various aspects of health and wellbeing globally. To address the health impacts of climate change, ESR is taking a comprehensive approach that includes mitigation to reduce climate change itself, while working on what needs to be done to adapt, protect and improve public health in the face of inevitable changes.

One area we are looking at is how climate-related changes to groundwater flow dynamics, including changes in water uses and sea level rise, will affect the quality of groundwater and connected surface water bodies. We are also investigating linkages between extreme weather events and waterborne disease outbreaks across New Zealand. This includes running a series of laboratory experiments exploring the effect of how increased groundwater salinity due to sea level rise, changes to rainfall, groundwater recharge and surface run-off and temperature, will affect the survivability of key pathogens and the indicators that are currently used as pathogenic indicators.

SHOWCASE



ESR showcase at 15th JSPS HOPE Meeting. Source: Dr Sophie van Hamelsveld.

Research shows potential for treated wastewater as nutrient source for indigenous plants

Waste products like manure provide key sources of nutrients for plants. Today, treated wastewater is reused for irrigation in countries around the world, supporting plants by providing phosphorous and other essential nutrients. This knowledge, coupled with the age-old problem of how to dispose of waste economically and safely, prompted ESR's Dr Sophie van Hamelsveld to ask if treated wastewater could be harnessed in New Zealand too, improving the health and quality of our plants.

One key question Sophie had to resolve was how using treated wastewater could affect the delicate biome of fungi that play a vital role in the lifecycles of our indigenous trees. That is when she turned to mānuka as a subject. It is widespread and plays a role in forests, as well as supporting an industry that depends on the species success. Most relevantly, mānuka relies on fungi for the same phosphorous that treated wastewater could provide.

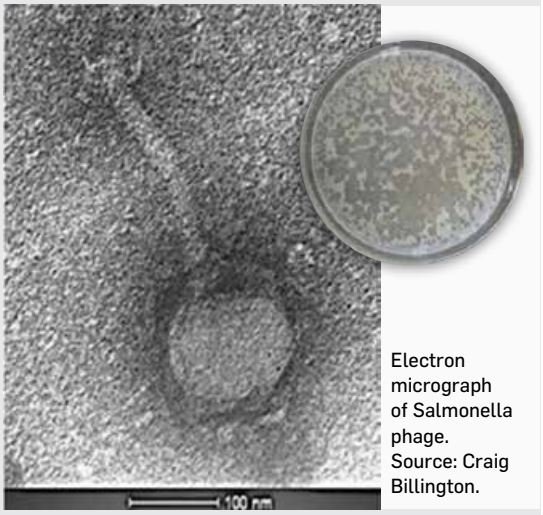
So, would using treated wastewater in irrigation upset this balance? Over the course of a year, Sophie and her colleagues led research in a greenhouse, using DNA sequencing to understand what fungi were present in the soil throughout the study. What they found was better than expected, with results indicating that short-term irrigation with treated wastewater does not negatively affect the diversity and abundance of fungi growing under mānuka trees. Additionally, the process could be a valuable way to provide nutrients and water to mānuka saplings without affecting fungal diversity, demonstrating a pathway for wastewater reuse in the context of a circular economy.

Environmental health impacts of human activities on landscapes are a key concern. Science is required to help find solutions that support New Zealand's food production growth and prosperity, while caring for the land we live in. ESR's Christchurch-based groundwater team have worked with DairyNZ over several years on a project to reduce nitrates flowing into groundwater. Nitrate reduction is important, as excess nitrate consumption can negatively impact human health, causing minor illnesses such as headache and nausea, through to serious conditions such as cancer.

The project is based around the installation of a series of prototype denitrification bioreactors. The reactors form part of a denitrifying wall, which is a trench filled with gravel and woodchips set below the water table, through which groundwater flows. It works by utilising the carbon leaching from the woodchips, to stimulate microbial processes that convert nitrate to nitrogen gas, which then escapes into the atmosphere. Unlike filtering, the nutrients do not accumulate, and the woodchips do not need replacing for decades. ESR's work on denitrification to support the primary industries was acknowledged this year when, in conjunction with DairyNZ, we received the Science and Research Award at the 2024 Primary Industry New Zealand Summit and Awards.

Environmental impacts are also being felt with anti-microbial resistance (AMR) becoming a global human and animal health emergency, exacerbated by the overuse of antibiotics and insufficiently treated waste streams. Climate change is expected to exacerbate the AMR crisis through higher temperatures, salinity changes and ultra-violet light levels leading to pathways which increase the transmission and uptake of AMR genes. ESR is leading a project to build a foundation for AMR surveillance in the environmental sector. The project will support future integrated AMR surveillance and investigate the connectedness of AMR and climate change by using environmental AMR isolates and focusing on New Zealand-specific factors.

SHOWCASE



Electron micrograph of Salmonella phage. Source: Craig Billington.

Tackling dangerous bacteria with viruses

While new antibiotic treatments are in the pipeline, the threat posed by antimicrobial resistance is increasing. We require strategies beyond conventional antibiotics to ensure that bacterial infections remain treatable.

This is where phages (formerly bacteriophages) come in, which simply are viruses that infect bacteria. Phages are able to solely kill and selectively target bacteria. They are the most common biological entities in nature and have been shown to effectively fight and destroy multi-drug resistant bacteria. Namely, when antibiotics fail, phages still succeed in killing the bacteria and may save a life from an infection. As such, phages are well placed to be harnessed in natural antimicrobial methods to control bacterial pathogens, including *Salmonella*.

A team of experts led by ESR Science Leader and phage expert Dr Craig Billington has isolated a number of *Salmonella* infecting phages from New Zealand and abroad. In their work, they have shown the characteristics of two of these phages and begun to explore their suitability for biocontrol purposes.

Early results have been promising, with the phage isolated by the team able to infect multiple *Salmonella* serotypes.

Microplastics – conclusion of AIM²

In March 2024, the AIM² (Aotearoa Impacts and Mitigations of Microplastics) Endeavour Research Programme concluded. Starting in 2018, this was a five-year study (funded by MBIE) looking at the state of microplastics pollution and the potential threats it poses to New Zealand's unique flora and fauna, ecosystem as well as people and the economy.

Co-led by ESR's Dr Olga Pantos and Dr Grant Northcott of Northcott Research Consultants, the study was the first of its kind to be carried out in New Zealand. The project involved researchers from six science and research organisations, supporting 12 PhD and seven masters' students in areas of research from social science to microbiology with an aim to improve the knowledge and understanding of the level and movement of microplastic pollution in freshwater, marine and terrestrial environments in New Zealand.

Findings from the study were presented at a symposium in May 2024, and covered areas such as social and cultural considerations, microplastics levels, characterisation, distribution, flow and fate of microplastics, and interactions with microbial communities. Also discussed were the marine species of biosecurity concern, fate and impact of associated chemicals, and changes to plastic itself in the New Zealand environment.

Impact for Māori

ESR, through its Māori Impact team, is committed to participation, leadership and the integration of mātauranga Māori and practice. Our transformative programmes like He Wai Māpuna and He Ō Uta, He Ō Tai are exemplars that highlight the initiatives of Māori Impact partnership in advancing indigenous knowledge and environmental stewardship.

He Wai Māpuna, a unique enterprise focusing on wai-based science delivery to iwi and investing in iwi to cultivate distinct knowledge, exemplifies this collaborative intent. One example is in partnership with Ngāti Toa Rangatira, Māori Impact has nurtured a strong collaboration aimed at revitalising Te Awarua-o-Porirua. This initiative emphasises showcasing environmental monitoring outcomes and articulating the iwi's aspirations guided by mātauranga Māori. Highlighting the inseparable link between environmental health and cultural integrity, this approach deeply resonates with stakeholders, whānau and iwi alike. A subsequent film event at Takapūwāhia Marae to present outcomes and results to date further amplified these connections, serving as a platform to showcase efforts and engage the community in the journey towards restoration.

Collaborations with institutions like the Geospatial Research Institute and the University of Canterbury on He Wai Māpuna, demonstrate strategic leadership in advancing inclusive scientific technologies to support the restoration of Te Awarua-o-Porirua. These partnerships enhance research capabilities and ensure indigenous perspectives enrich ESR's scientific methodologies and outcomes.

Similarly, He Ō Uta, He Ō Tai focuses on increasing the number of Māori in STEMM fields. Supporting STEMM as science, technology, engineering, mathematics, and mātauranga Māori, He Ō Uta, He Ō Tai demonstrates Māori Impact's leadership in integrating traditional knowledge with cutting-edge genomic science. By embedding mātauranga Māori into the curriculum, the bootcamp equipped participants with scientific skills and empowered them to navigate the interface between indigenous knowledge systems and modern technology. This approach prepares future leaders who can drive inclusive scientific practices grounded in cultural relevance.

Central to these initiatives is the principle of partnership. Māori Impact recognises collaboration achieves sustainable and impactful outcomes. By partnering with entities like Ngāti Toa Rangatira and Pūhoro STEMM Academy, the reach and effectiveness of programmes is amplified, through a collective approach to education and leadership development within Māori communities.

Looking ahead, ESR is advocating for a future science system with higher Māori inclusion, emphasising the necessity of partnership. The commitment to participation, leadership, and mātauranga Māori through programmes like He Wai Māpuna and He Ō Uta, He Ō Tai not only empowers communities and nurtures future leaders but catalyses a transformative shift towards a more inclusive and sustainable future, where indigenous knowledge and scientific excellence go hand in hand.

Scan QR code to watch a highlight video of the Ngāti Toa Rangatira film event

SHOWCASE

Participants genomics bootcamp. Source: ESR.

Empowering future Māori scientists: genomics bootcamp

ESR's first-ever genomics bootcamp hosted 12 tertiary and high school students from across Aotearoa. This collaborative partnership with Pūhoro STEMM Academy, Ngāti Toa Rangatira and Oxford Nanopore Technologies aimed to inspire a new generation of Māori epidemiologists and virologists, a need highlighted during the COVID-19 pandemic.

The bootcamp provided an 'open door' to genomics and bioinformatics, showcasing daily public health-centric activities and developing connections between Māori students and leading genomics scientists in Aotearoa.

The bootcamp centred around a mock outbreak scenario, designed to showcase the critical leadership role of genomics in maintaining safety. This immersive experience aimed to deepen participants' understanding of potential careers in genomics and inspire the next generation of Māori scientists. Māori Impact team scientists underscored the vital connection between genomics and mātauranga Māori, highlighting the importance of integrating cultural perspectives into scientific practices. The participants, ranging from Year 12 to masters' students, came from diverse study areas and various regions across Aotearoa.

The bootcamp was structured over three intensive days:

- **Day one:** Basics of handling laboratory equipment and loading sequencers.
- **Day two**: Advanced sequencing techniques and command line interface training.
- **Day three**: Data analysis and genome interpretation to solve an outbreak mystery.

One participant from Papakura High School reflected, "The experience has definitely enforced the idea that you need to understand technology in modern science." Similarly, another participant from Palmerston North Boys' High School shared, "This experience has opened my eyes, especially regarding genetics, genetic diversity, different microbes, and organelles. It was fascinating to see the diversity within the field."

The genomics bootcamp is a testament to leadership, participation, and the integration of mātauranga Māori in science, and has set a new benchmark for future educational programmes while sowing the seeds for a generation of informed and inspired Māori scientists.

Scan QR code to watch a highlight video of the genomics bootcamp

He Pūtaiao, He Tāngata – Māori impact strategy

He Pūtaiao, He Tāngata (HPHT) is a high-priority strategic initiative for ESR. Recognising that creating impact with Māori touches all aspects of our organisational operations, the strategy aims to elevate our work with Māori from an activity to an integral part of ESR's identity. Over the past 12 months, a review of HPHT has progressed, with work moving from phase one onto phase two. Phase two involved the convening of an expert panel to provide individual and collective feedback on ESR's current HPHT strategy and provide advice as to how ESR might refresh HPHT moving forward. The panel comprises nine respected experts, with a diverse range of experience in the science system and across Māoridom, who are willing to support ESR refresh its strategy.

Phase three and phase four of the HPHT review are expected to be completed late this year, with a refreshed strategy expected to be ready by 2025.

Staff at Wallaceville Science Centre. Source: ESR.

Our workplace
Tā mātou taiao mahi

Operating as a sustainable and resilient organisation remains a critical priority for ESR. This requires ongoing development of our business systems and people to grow capability and enable better science in a safe and productive workplace. These principles have guided a significant development programme over 2023–2024, and remain important as we prepare ourselves for sector-wide change and shape ourselves to be a more sustainable organisation over 2024–2025.

Our people

ESR is committed to our values and the principles of being a good employer. To this end we continue to strive and foster a positive, respectful and inclusive workplace culture, with a work environment that encourages and empowers our people to excel. We recognise change is a challenging experience, and upholding these principles is a foundational for how we navigate the uncertainties ahead.

Across 2023–2024, we have utilised our values of team spirit, quality counts, doing the right thing and pushing boundaries to help build a culturally aware, safe and resilient environment that supports our employees. By doing this, we empower our staff to bring their full, authentic selves to work. This supports us to develop an organisation that is agile, energetic and recognises the contribution and individuality of all employees.

This includes being an employer of choice for Māori scientists and professionals. Through our investment in and support of the Pūhoro STEMM Academy, we provide internships to attract young Māori science students, with the intent of growing and advancing Māori science leadership and capability.

As part of our organisational values, we also encourage our people to challenge their thinking. This enables ESR to be innovative and provide strategic leadership in science and technology. To support this, we utilise the principles and practices of equal employment opportunities, provision of a diverse workplace and inclusive culture, and an environment that enables each person to share their views and perform to the best of their ability.

We expect workforce planning to be assessed alongside possible changes to the wider science system. Once more information is available on the outcome of the Science System Advisory Group[9] review, we will pivot to build capabilities that align with ESR's future needs and those of the SIT system.

Kia Toipoto Action Plan

This year, ESR prepared its second Kia Toipoto Report and 2024–2025 Action Plan. In a refreshed approach, we engaged across the workforce to gather inputs and thoughts on the six focus areas within Kia Toipoto, resulting in a feedback-informed Action Plan.

We also launched our Diversity, Equity, Inclusion and Belonging Commitment Statement, and established our first Diversity, Equity, Inclusion and Belonging Council – an employee led network with the purpose of advocating, informing and monitoring ESR's Diversity, Equity, Inclusion and Belonging approach. The Council will help ESR to shape the organisational culture to be supportive and inclusive.

Optimising our culture

A new employee satisfaction and engagement survey was launched this year, with a staff participation rate greater than 80 per cent. This was the first survey of its type for several years, and the high participation rate shows support for both the survey itself and the engagement approach. The results are representative of our staff experiences and provide valuable and useful information on which to build both team and organisational initiatives.

This year also saw the introduction of the Clifton Strengths assessment tool. The tool measures a person's unique talent, and natural patterns of thinking, feeling and behaving. The results are categorised into 34 themes, which form a valuable assessment to support individual awareness, development and wellbeing. The approach is new and is gathering momentum across the organisation.

ESR also completed a number of policy refreshes during the year including an update of the Flexible Working approach and the Respectful Workplace Policy, formerly the Anti-Bullying and Harassment Policy.

The revision of our cultural capability programme is ongoing, ensuring our training and learning opportunities support the He Pūtaiao, He Tāngata strategy.

Nanopore hand-held sequencer. Source: ESR.

9 The Science System Advisory Group has been established by the Minister of Science, Innovation and Technology provides advice to the government on strengthening the science, innovation and technology system.

Our people by the numbers

595 employees

A decrease of 3 over previous year.

- **44 years is the average age**, which is the same as last year.
- **47** promotions at ESR and **11** secondments.

Radiation safety training. Source: ESR

Staff turnover

Our annual rolling average voluntary turnover based on headcount is **7.9%**, **2.3** percentage points lower than the same time last year.

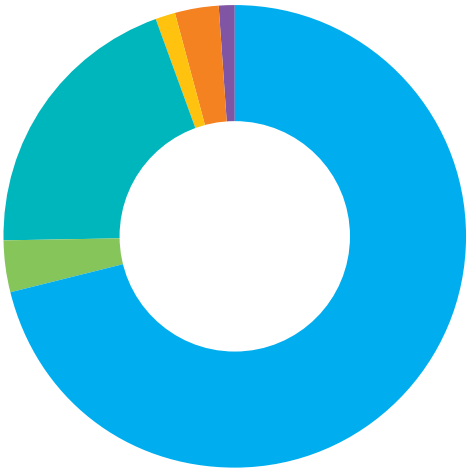
This is lower than the average for public sector organisations, which was **15.9%** for **2023**.

ESR annual rolling average

Average public sector organisations

Ethnicity

- European **71.3%**
- Māori **3.6%**
- Asian **19.6%**
- Pacific Peoples **1.4%**
- Middle Eastern, Latin American and African (MELAA) **3.2%**
- Other **0.9%**



Self-identified ethnicity at the time of employment. Workplace attractiveness for Māori and Pacific peoples is a focus area.

Health, safety, and wellbeing

- **121** health, safety, and wellbeing event notifications were received in 2023–2024 which reflects the continuing change in health and safety awareness and maturity.
- **34** related to near misses, **47** injury/illness.
- Total non-injury/illness **40**.

Radiation safety training. Source: ESR.

Headcount and number of full-time equivalents

Headcount

34 Fixed term **561** Permanent **595** Total

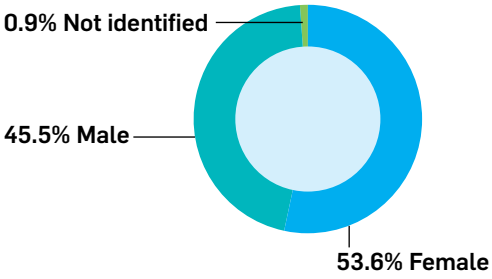
FTE

32.8 Fixed term **533.1** Permanent **565.9** Total

Gender pay gap

- **14.1%** Gender Pay Gap (favouring males). As of January 2024, **down from 15.6%** as reported in December 2022.
- **66.4% of ESR staff are women** which is higher than the 2023 public service average and 0.6% lower than the previous year.

Gender identity across management roles



Average days lost due to sickness, accidents, domestic leave

- **8.42 rolling average days** lost due to sickness, accidents, and domestic leave.
- **An increase of 0.72** on the previous year.

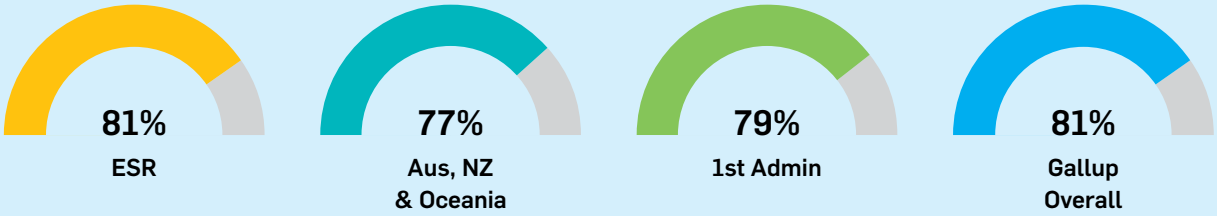
ESR DNA laboratory. Source: ESR.

Engagement survey results

In October 2023, ESR carried out its first employee engagement survey in several years, partnering with the global engagement leader – Gallup.

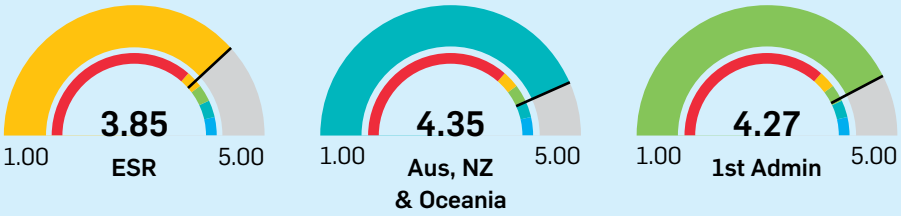
There was a high-level of participation with **81 per cent** of ESR people completing the survey. This level of participation is high for a first survey and is aligned with Gallup's leading practice organisations in their database.

Our participation



ESR's overall employee engagement mean was 3.8 (out of 5). This is an average of all engagement items included in the survey.

Our engagement mean



This result has given ESR a baseline and starting point for which to inform action planning at both the team and organisational level. Our two highest engagement scores were for items that focus on ESR's mission and purpose and belief in the quality of our work. It is clear from these results we believe we are committed to doing quality work and that ESR has a clear mission and purpose.

Examining genome sequencing run metrics. Source: ESR.

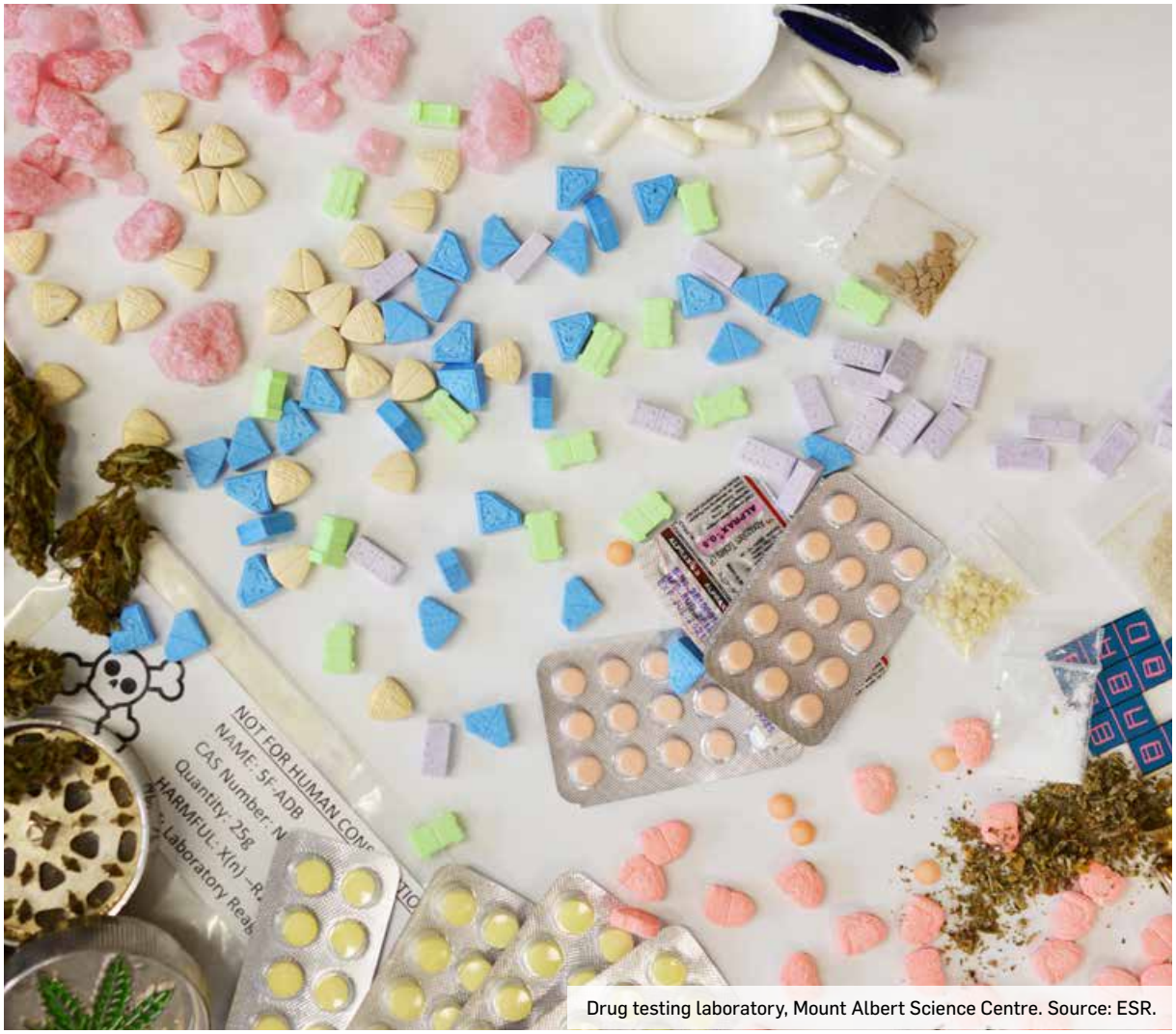
Health, safety and wellbeing

Our staff play an essential role in creating a safe and healthy working environment. They are supported by our Health, Safety, and Wellbeing (HSW) Policy statement, procedures, and active and visible leadership practices. In addition, we have a number of HSW representatives who come together regularly through various forums to discuss all things related to HSW, including areas going well and areas we can learn from. This helps to leverage and take every opportunity possible to improve.

This active operational approach has been instrumental in growing our maturity, providing clarity of risks and control methods. We are building a positive HSW culture of change that encourages our people to speak up, thereby keeping them healthy and safe.

Our HSW Engagement and Participation model improves cooperation between our employees and the unions. The model utilises the collective expertise and experience of all parties involved to facilitate safe dialogue regarding risk and potential solutions which has enhanced our HSW Committee's outcomes.

To keep improving, we will continue to engage with our talented team with work currently underway to undertake the WorkSafe NZ SafePlus self-assessment. This assessment will enable our employees and all levels of management and governance to submit feedback on essential components of leadership, risk management, and worker engagement that focus on an organisation's HSW capacity in relation to a maturity scale.



Drug testing laboratory, Mount Albert Science Centre. Source: ESR.

Being a good employer

ESR embraces its responsibility of being a good employer. The summary below shows our activities this year against the seven elements of being a good employer as defined by the Human Rights Commission.

Our workplace activities	
Our leadership, accountability and culture	Our Te Kāpehu Performance Experience framework is based on building a collaborative, high-performing culture. It encourages clear accountability through meaningful performance development conversations and defined work outputs aligned to business plans and our strategic objectives. This year we successfully completed the Senior Leadership Coaching pilot established in 2022–2023. Over the past two years, 20 of our senior leaders participated in this programme, building relationships across our Tier 3 leaders and encouraging development through a coaching programme centred around the results of the Human Synergistics Life Styles Inventory Assessments I and II. Following on from the pilot, ESR commenced consulting on the development of expectations of our leaders which will allow alignment of ESR's future leadership development programmes. This year a further 10 emerging leaders attended the NZIM Emerging Leaders Programme run in conjunction with Manaaki Whenua – Landcare Research. This is the second year ESR has participated in this programme. We also saw the establishment of the ESR Senior Leaders Network in 2023–2024. This monthly network provides an opportunity for ESR's most senior leaders to connect, learn and share across a range of topics.
Recruitment selection and induction	We are committed to improving the diversity of our workforce and promoting a culture of inclusion with a focus on the elimination of bias and ensuring equal access to opportunities. We encourage our people to take advantage of the online courses we provide to address bias in the workplace. Our recruitment and selection processes continue to reflect best practice and align with the Public Service Commission – Te Kawa Mataaho Workforce Assessment Model Standards ensuring that selection is focused on recognising competencies, values, skills knowledge and experience, backed by appropriate assessment and selection tools, to ensure the best candidate is selected in a fair and equitable manner. This year ESR refreshed its induction approach following engagement with recent hires in both leadership and non-leadership roles as well as existing staff. ESR also introduced a new automated software reference checking tool which helps to reduce bias, notifies any suspicious activity and quantifies feedback for insights.
Employee development, promotion and exit	Over the year ESR committed to developing Career Paths for Science as part of the ESR Kia Toipoto Action Plan. It is anticipated this will be a two-year programme encouraging cross functional development within our science teams and providing career certainty especially for those employees early in their careers. We seek feedback from all employees who leave ESR by providing an opportunity to participate in an exit interview, either online or face-to-face. The feedback is consolidated and themed to assess how we can continue to build on areas of strength and improve our working environment. This year a new exit survey tool was introduced, providing ESR the ability to improve reporting and trending of information provided.

Our workplace activities	
Flexibility and work design	We support and promote flexible working arrangements. This includes flexible hours and working from home or alternative locations, and gradual return to work for new parents. We encourage our staff to take annual leave in the year it is accrued and support them to manage their hours to maintain wellbeing. We also encourage our staff to take their volunteering day, which aims to support staff who wish to contribute to the wider community through volunteer work. This year saw a full refresh of ESR's flexible working approach. This refresh was completed in conjunction with Public Service Association (PSA) delegates, with input from the newly established Diversity, Equity, Inclusion and Belonging Council and a review of approaches currently in place across the Public Sector. This refresh shows ESR's ongoing commitment to support and promote flexible working arrangements. This includes flexible hours and working from home or alternative locations, and gradual return to work for new parents.
Remuneration, recognition and conditions	Our Te Kāpehu and ESR's new remuneration frameworks aim to support staff to feel valued, recognised and rewarded for their contribution. The implementation of the new remuneration framework, jointly designed between ESR and PSA, began this year. The new remuneration framework's aim is to support staff to feel valued, recognised and rewarded for their contribution. There was also a review of all part-time terms and conditions of employment to ensure consistency in terms and conditions with full-time counterparts. All Holidays Act 2003 remediation payments to current employees have been processed and ESR continues to reach out to past employees in an effort to ensure they can collect any remediation payments available. There was also an external audit of the new payroll system which noted that overall, effective controls are in place and confirming that the system set up is Holidays Act 2003 compliant.
Harassment and bullying prevention	We have zero tolerance of bullying and ensure matters are dealt with promptly and appropriately. Our Code of Conduct outlines the standards of behaviour we expect of our people, how to deal with unacceptable behaviour and where to access further information and support if required, including the Employee Assistance Programme. This year saw a full refresh of ESR's Anti-Bullying and Harassment Policy and Guidelines. This has resulted in a more positively framed Respectful Workplace Policy and was completed in conjunction with PSA delegates, with input from the newly established Diversity, Equity, Inclusion and Belonging Council and a review of the Safe Work Australia Sexual and Gender-based harassment Code of Practice released in December 2023. We also refreshed our Protected Disclosures Policy and Guidance to ensure it remains up to date.
Health and Safety environment	We continually improve our health and safety systems and performance to keep our employees healthy and safe at work. This is supported by our Health, Safety and Wellbeing Policy, implementation of standard operating procedures, provision of resources and HSW training for all staff.

SHOWCASE

ESR staff at Kenepuru Science Centre. Source: ESR.

Progress on Kia Toipoto and Gender Pay Principles

Kia Toipoto is the Public Service Gender, Māori, Pacific and Ethnic Pay Gap Action Plan 2021–2024. The plan focuses on improving equity and fairness in public service workplaces by removing bias and discrimination, ensuring fair pay, recruiting diverse talent, and cultivating inclusive environments. ESR is committed to fairness and equity, regularly reviewing policies and practices related to remuneration, development and selection.

For the 2024 Action Plan, a full data analysis and comprehensive consultation took place in October and November 2023. Due to the limited number of individuals who have disclosed their gender diverse status, this demographic segment has been excluded from our analysis to uphold the privacy requirements of individuals.

Two-thirds of ESR's workforce are female, with more than half of executive and managerial roles held by females. The science domain comprises 68.5 per cent females and 31.5 per cent males (as of 1 January 2024).

Māori and Pasifika representation at ESR is 3 per cent and 1.4 per cent respectively, while Asian ethnicities form the second-largest group.

Due to the small number of self-identified Māori, Pasifika, or Middle Eastern, Latin American and African employees, their pay gaps are not statistically robust. Nonetheless, this data will be included in the Kia Toipoto progress report over the next 12 months.

The like-for-like gender pay gap at ESR ranges from 0.4 per cent in favour of females to two per cent in favour of males. The organisational gender pay gap is 14.1 per cent as of January 2024, down from 15.6 per cent in December 2022 (based on a September 2022 analysis). This difference is primarily driven by the gender distribution of employees within the organisation, a phenomenon known as 'vertical occupational segregation.' This is a common driver of gender pay gaps, particularly in public sector organisations with a high proportion of women in frontline roles and prompted an internal review of equity promotions applications and approvals.

Kia Toipoto outlines actions and targets to ensure fairness and equity in public service workplaces. The Gender Pay Principles provide a framework for eliminating gender-based inequalities through collaborative action between agencies, employees and unions.

Kenepuru Science Centre demolition. Source: ESR.

Business system resilience and capability

To ensure we have the right systems, processes and capability to grow the organisation and guarantee ESR is sustainable and resilient, we are investing in property development, data security and governance. We do this by ensuring the infrastructure that supports our science and service is robust and flexible. Strong systems and infrastructure help maintain the trust and confidence of our stakeholders in our data, critical analyses, intelligence and decision-making abilities.

Property

A milestone event for ESR was shareholder approval to progress with the redevelopment of the Kenepuru Science Centre (KSC), paving the way for contemporary science infrastructure to meet the needs of New Zealand. This investment underscores the vital role ESR plays in the health and wellbeing of all New Zealanders. The redevelopment includes a mix of modern laboratories, research support spaces, a forensic service centre and offices.

Being a fit-for-purpose build, the new infrastructure will allow ESR to operate more innovatively, collaboratively and efficiently, as well as embracing and enabling modern and changing ways of working.

At over 40 years old, the current buildings pose an earthquake risk, are outdated and have excessive maintenance and running costs.

The redevelopment project is progressing on time and to budget, with detailed design now completed. A feature of this process has been a co-design process with Ngāti Toa Rangatira, which will see cultural elements featured on the exterior and interior of the building.

Rau Paenga, the Government Infrastructure Delivery Agency has been engaged to assist ESR with project delivery expertise including advice, risk management, cost reporting, consultant management and governance.

Demolition of buildings to make way for the construction has been completed and the site has been handed over to Hawkins Limited, appointed as the main contractor via an open tender process. The construction phase commenced in June 2024. The project will be delivered in two phases, with construction of the main facility planned for completion in early 2027 and ancillary facilities and landscaping due for completion in 2028.

At the Christchurch Science Centre, the Trace Organic Chemistry Laboratory has been expanded and refitted.

The previous layout was inefficient, lacked capacity and presented health and safety issues for those working in a cramped environment. The new laboratory was designed in consultation with relevant staff and allows ESR to expand its drugs in wastewater programme, so testing is possible in up to 50 per cent more locations across New Zealand, more often, and for more substances.

It also provides capacity to undertake more projects that support the safety of New Zealand's food supply and protect the economy, expand into new areas of research, and to host more postgraduate students requiring our specialist equipment.

It is fit-for-purpose, has a flexible layout, is more spacious and is built to Physical Containment 2 Laboratory standards.

Information technology and systems

Over the past year, information technology and systems work has focused on modernising solutions in line with digital government transformation work, led by the Department of Internal Affairs. This has resulted in the update and future proofing of a number of key systems.

Alongside this, work is continuing on identification of cost reduction opportunities, including reviewing services and contracts to ensure they are fit for purpose and delivering value, as well as doing a stocktake of information systems.

A further focus has been to increase the resiliency of our IT systems. By using various sector models, our technology and processes have been evaluated and updated as appropriate. Progress on initiatives within the security programme continue to be made against all milestones. This includes implementation of controls and processes to meet New Zealand government compliance requirements, as well as implementing vulnerability management and incident management processes and procedures. A number of old systems were also decommissioned.

Working closely with Health New Zealand – Te Whatu Ora, a number of significant milestones were also achieved. Of particular note, the implementation of the Notifiable Disease Management System, which is an operational disease management system to support the investigation, response and control of communicable disease, and strengthens New Zealand's surveillance systems.

In addition, the nationwide rollout of troponin[10] testing was completed successfully. This enhances diagnostic capabilities across New Zealand.

ESR's technology staff continue to work across the CRI group by sharing information in an effort to maximise use of resources and reduce duplication of effort. ESR is an active participant in this collaboration and seeks opportunities to work across the pan-CRI group.

Continuing our commitment to sustainability

During the year, our Sustainability Strategy and Action Plans, which outline our commitment to a sustainable future, have been finalised. These plans include specific targets and actions, supported by allocated resources and budgets. ESR's sustainability policy and strategy align with the United Nations Sustainable Development Goals.

Our Board, Senior Leadership Team, and staff are dedicated to making meaningful, sustainable changes in our daily practices and community impact.

Over the past 12 months, work has been undertaken in the following areas:

- The Sustainability Committee and subgroups (action groups) are up and running. They have begun the implementation of projects and processes to improve ESRs carbon footprint and policies.
- Launch of a car-pooling network at KSC to support sustainable travel and the reduced carpark situation due to building work.
- Completion of an electricity audit part-subsidised by Energy Efficiency and Conservation Authority.

Greenhouse Gas Emissions Reduction

ESR has reported on emissions since 2019. The 2023–2024 report is our fifth annual greenhouse gas emissions report, and we remain committed to measuring and reporting on our efforts to reduce greenhouse gas emissions.

The overall emissions total for FY23 was 9,652 tCO2e (tonnes of carbon dioxide equivalent). This is a 3,553 tCO2e

10 A troponin test measures the levels of troponin T or troponin I proteins in the blood. These proteins are released when the heart muscle has been damaged, such as occurs with a heart attack.

increase in emissions when compared to ESR's base year of FY19 (6,099.1 tCO2e). Since FY22, ESR has achieved a reduction in Category 2 emissions, indirect emissions from imported energy (a reduction of 68.78 tCO2e).

Due to increased staff numbers and capacity, ESR has seen a continued increase in Category 4 emissions, indirect emissions associated with the use of products from the organisation. In FY19 these emissions measured at 2,670.9 and in FY23 they measured 7,410.58. Work to identify where changes can be made to and/or reduce Category 4 emissions is being worked out for the next financial year.

Emissions reduction activities in 2023–2024 included:

- completion of Toitū Carbon reduce programme and audits for all years between FY20 and FY23
- commenced development of 2030 carbon emission targets and a related plan on how to achieve these.

Waste reduction

ESR has been prioritising waste reduction for the last four years. In late 2023, ESR contracted Sustainably, an external waste consultant to undertake a full waste audit across all ESR sites. This audit provided reporting, recommendations and opportunities to focus on waste reduction.

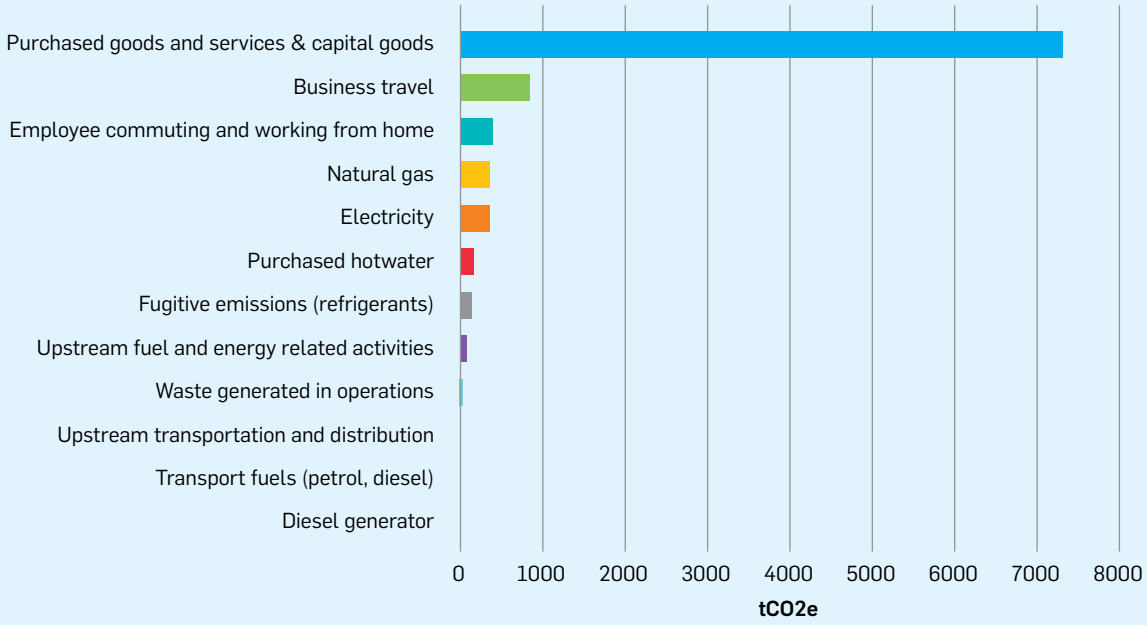
The waste audit report identified a review of our waste services provider as the top priority for action. As a result, we launched a request for a proposal to find more sustainable options for our waste removal.

The audit also identified the large amount of waste generated by paper towels heading to a trial to remove paper towels from the bathrooms at the Christchurch Science Centre and replace them with Dyson hand dryers. This has resulted in a reduction in the paper towel waste from this site.

Other waste reduction activities in 2023–2024, included:

- launching the ESR waste request for proposal
- 97 per cent of materials from the ESR rebuild demolition diverted away from landfills as scrap metal or timber, and other waste has been recycled or re-used to produce products such as fertiliser, glass and concrete aggregate
- ongoing use of Mutu software, which monitors repurposing products and items to divert them from landfill, along with repurposing assets may otherwise be destroyed. During this year, we saved 3.2 tonnes in items from landfill through reuse.

Top emissions sources and their related emissions FY23



SHOWCASE

Routeburn Flats. Source: ESR.

ESR receives Toitū Carbonreduce Certification

ESR is proud to have received Toitū Carbonreduce Certification, a testament to the remarkable work that has gone into embedding sustainability in our work.

The certification recognises ESR has gone through an independent verification process for our carbon emissions, to ensure it is complete, accurate and meets international standards. It further confirms ESR is measuring, managing and actively reducing our carbon emissions according to Toitū requirements.

The Toitū accreditation confirms ESR's greenhouse gas emissions have been measured to the ISO 14064-1:2018 global standard. The certification allows ESR to create meaningful goals to further reduce carbon emissions.

Toitū's endorsement further demonstrates ESR's ambition to connect our actions with our outcomes.

We are committed to science that empowers communities to thrive and prosper, and delivered in a way that protects the land and its people. This is important for us as an organisation, as we ask ourselves and our clients to measure and consider practical steps to reduce environmental impacts and carbon emissions.

Attaining Toitū Carbonreduce certification is a key milestone for ESR on our journey to meet our sustainability priorities.

TOITŪ
CARBON REDUCE
ISO 14064-1
ORGANISATION

Source: AdobeStock.

Our governance and leadership teams

Te mana whakahaere me te rōpū kaihautūa

Our Board of Directors

ESR's Board sets the institute's strategic direction and delegates responsibility for the management of the institute to the Chief Executive Officer. ESR's Board is appointed by the Minister of Science, Innovation and Technology. Directors' remuneration is set by shareholding ministers under the fees framework approved by Cabinet.

The Board is responsible for ensuring our governance is purposeful, robust and accountable. Their responsibilities also include acting on behalf of, and being accountable to, the Minister of Science, Innovation and Technology and the Minister of Finance. Our Board fulfils regulatory expectations under the Companies Act 1993, Crown Research Institutes Act 1992, Crown Entities Act 2004 and Public Finance Act 1989.

The Board operates in accordance with the Board Charter. It has two standing committees; the Risk and Assurance Committee, and the People, Culture and Performance Committee, and one project-based committee, the Property Development Committee. The committees are operating in accordance with a Charter or Terms of Reference (in the case of the project-based committee) approved by the Board.

The Board are supported by our Senior Leadership Team and, until 30 June 2024, an independent Strategic Science Advisory Panel. The Board and its committee members are subject to ESR's Code of Conduct.

Director profiles

Professor Sarah Young (Chair)

Professor Sarah Young was appointed to the ESR Board in June 2023 as Chair. Sarah is a professor of immunology and Executive Dean of Science at the University of Canterbury. She has expertise in developing and leading people, strategy and policy and has undertaken a variety of board and leadership roles.

Kate Thomson

Kate Thomson was appointed to the ESR Board in July 2018. Currently, she is the Director Finance, Risk and Digital Solutions at Upper Hutt City Council. Kate was based in Australia working in the engineering and research sectors as a senior executive.

Kate is an experienced senior executive and has held several senior roles in the commercial sector during her career. Kate holds a post-graduate certificate in science and technology and is a graduate of the Australian Institute of Company Directors.

Dr Matthew (Matt) Glenn

Dr Matt Glenn was appointed to the ESR Board in February 2022. Matt is Chief Executive Officer (CEO) for the Kiwifruit Breeding Centre, a joint venture between Zespri and the CRI, Plant and Food Research. He was previously CEO at Hill Laboratories, New Zealand's largest private analytical testing laboratory; and CEO of Robotics Plus, an agricultural automation and robotics start up.

An experienced executive in the technology industry, he holds a PhD in molecular biology from the University of Leeds, United Kingdom, and held the role of Head of Genomics at Genesis, which included, what was at the time, the largest DNA sequencing facility in the southern hemisphere.

Matt is also a director at consulting firm, Idea Partners.

Justine Gilliland

Justine was appointed to the ESR Board in February 2022 and is a member of the Risk and Assurance and Property Development Committees.

Justine is an independent director and strategy consultant, serving on a number of boards across the food and fibre, health, insurance, environment, and research, development and science sectors, where she chairs people and culture committees, and is a member of finance, audit and risk committees. She is also currently the Partnerships Director for the BlueFloat Energy and Elemental Group offshore wind partnership, and chairs or is a member of advisory and governance groups for the energy sector, food and fibre sector companies. She is the former Chief Executive of regional development agency Venture Taranaki; and previously held a range of senior management roles in the public service. Justine has law and arts degrees and resides in Taranaki with her young family.

Director profiles

Dr Melissa McLeod

Dr Melissa McLeod was appointed to the ESR Board in February 2022.

Melissa (Ngāi Tahu) is a public health physician and Associate Professor working at Te Rōpū Rangahau Hauora a Eru Pōmare, University of Otago, Wellington. She teaches postgraduate epidemiology and general public health and brings rich research expertise in Māori health, epidemiology (including quantitative aspects).

Catherine Abel-Pattinson

Catherine Abel-Pattinson was appointed to the ESR Board in June 2023. Catherine is an experienced non-executive company director with expertise in information and communication technology, biotechnology, and health care. Catherine is currently on the International Accreditation New Zealand Board, Whakarongorau Aotearoa New Zealand Telehealth Services, and is the Chief Operations Officer of Netsafe, as well as a member of Global Women.

Sir Ashley Bloomfield KNZM

Sir Ashley Bloomfield was appointed to the ESR Board in June 2023.

Sir Ashley trained in medicine at the University of Auckland and specialised in public health medicine. He has 25 years' experience in public policy and health leadership, including at the World Health Organization in Geneva.

Sir Ashley has held several senior leadership roles in the health system since 2009, including as Chief Executive of Hutt Valley District Health Board from 2015–2018. He was New Zealand's Director-General of Health and Chief Executive of the Ministry of Health from June 2018 to July 2022 and led the country's health response to the COVID-19 pandemic.

He was appointed a Knight Companion of the New Zealand Order of Merit (KNZM) in the 2023 New Year's Honours for services to public health and is now a Professor at the University of Auckland's School of Population Health.

Director profiles

Dr Bruce Campbell CNZM

Dr Bruce Campbell was appointed to the ESR Board in June 2023. Bruce is a chartered director and consultant, holding directorships with Horticulture New Zealand (Inc.) and the New Zealand Winegrowers' Research Centre Limited. Bruce holds a Doctor of Philosophy (PhD) in ecology from The University of Sheffield, UK and is the former Chief Operating Officer of Plant and Food Research. Bruce is experienced in developing and implementing collaborative strategies linking science and business to benefit prosperity, nature, and people.

Bruce is a recipient of the 2023 Companion of New Zealand Order of Merit, 2017 Prime Minister's Science Prize, 2017 Horticulture New Zealand Industry Service Award and 2016 Royal Society of New Zealand Thomson Medal for outstanding leadership of agricultural and horticultural science. Bruce's consulting work is currently focussed on partnerships connecting science and Te Ao Māori to support the natural world Te Taiao and our place within it. Bruce is also a Trustee of the Kerikeri Peninsula Conservation Charitable Trust.

Strategic Science Advisory Panel

The Board's Strategic Science Advisory Panel (SSAP) plays a crucial role in maintaining the high quality of our scientific endeavours and staying receptive to new international developments and ideas. The panel offers the Board valuable insights on the quality and strategy of ESR's science, as well as its engagement with and adoption of new international advancements. The panel also evaluates the competitiveness and quality of ESR's scientific activities, offering suggestions for improvement and any additional scientific advice as requested by the Board.

Over the past year, SSAP presented to the Board and management a Management Report on Precision Health from the April 2023 meeting which outlined potential opportunities for ESR in this space. The Board met with the SSAP to discuss the reflections from SSAP members on the approach it has undertaken over the past years to inform the shape and form of the SSAP for the future. This included how the SSAP members could contribute to ESR's science portfolio planning, strategic priorities and ESR's focus moving forward.

In response to the evolving scientific landscape and the Government's review of the science sector underway, the Board is taking the opportunity to reassess ESR's future direction and the role of the Strategic Science Advisory Panel (SSAP). This reassessment aims to ensure that the SSAP continues to provide maximum benefit to ESR in alignment with the broader science sector reforms. Consequently, the Board has decided to temporarily pause the SSAP and will revisit its structure and advisory scope post-review.

The terms of the current SSAP members, Dr Liz Jazwinska, Professor James Curran and Dr Kēpa Morgan, concluded on 30 June 2024. The Board is appreciative of their invaluable contributions which have been instrumental in ensuring ESR's science remains of the highest quality and receptive to international advancements.

Further information on the SSAP is available in the Appendix section on page 89.

Our Senior Leadership Team

ESR's Senior Leadership Team (SLT) use their science and business expertise to provide strategic and operational advice and support to the ESR Board and its committees. The role of the Chief Executive and SLT is to manage day-to-day operations on behalf of the Board and the shareholding ministers.

Senior Leadership Team members 1 July 2023 to 30 June 2024

To view their biographies, visit ESR's website (www.esr.cri.nz) or LinkedIn.

From left to right:

- Dr Jill Vintiner – General Manager Health
- Professor David Murdoch – Chief Science Advisor (since March 2024)
- Wim Nijhof – General Manager Environment
- Dr Philip Carter – Acting Chief Scientist (from November 2023–March 2024)
- Trish Bolger – General Manager Strategy
- Dr Brett Cowan – Chief Scientist and General Manager Research (until November 2023)
- John Bone – General Manager Forensic
- Jymal Morgan – General Manager Māori Impact
- Peter Lennox – Chief Executive (until August 2024)
- Natalie Lombe – General Manager People and Culture
- Mark Ottaway – General Manager Business Services

Part B:
Our performance
Tā mātou whakatutukitanga

Water purification system, health and environment laboratory. Source: ESR.

Crown entity performance

Ministry of Business, Innovation and Employment core generic performance indicators are reported below:

Strategic objectives	Performance measure	Purpose	FY 2024 budget or target	FY 2024 Year-end result	FY2023 Year-end result
Strengthening business systems and processes	**End-user collaboration:** revenue per full-time employee (FTE) from commercial sources	Domestic and international commercial revenue targets for end-user collaboration (revenue per FTE from commercial sources) and the knowledge exchange indicator (commercial reports per FTE) reflect commercial research activity.	$207,007	$167,351	$173,813
	Financial indicators: revenue per FTE	Amount of revenue per FTE.	$238,000	$235,500	$219,900
Reshaping ESR's science	**Science quality:** impact of science publications*	Impact of science publications (measured using web of science citations for the previous calendar year).	5.4	4.3	5.4
	Research collaboration: publications with collaborators	These refer to publications we have prepared in collaboration with authors at other New Zealand institutes and/or international authors.	≥85	84	81
	Technology and knowledge transfer: commercial reports per scientists' FTE	Technology transfer refers to the process of conveying results stemming from scientific and technological research to the marketplace along with associated skills and procedures. It is an intrinsic part of the technological innovation process.	≥0.39	0.16	0.18

* Calculated for a calendar year, although reported as of 30 June 2024, this result is calculated for a calendar year (1 January to 31 December 2023).

All CRIs report against these core generic operating measures. These generic performance measures are designed to provide consistency across CRIs.

Key performance indicators

Strategic objective: to deliver greater impact with and for Māori and to be a leading Te Tiriti-partnered CRI

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
Percentage increase from FY22 baseline in the number of co-designed research projects with iwi	The purpose of this measure is to demonstrate growth in ESR's investment in a pipeline of impactful Māori research.	**39%**	≥ 20%	20%
Percentage of SSIF funding allocated to projects led by and co-designed with Māori	The purpose of this measure is to demonstrate growth in ESR's investment in a pipeline of impactful Māori research.	**39%**	≥ 20%	17%
Percentage satisfaction of key partners with our approach and delivery of the He Wai Māpuna programme	This measure shows that a pipeline of co-designed research programmes and relationships are developed to achieve enduring partnerships.	**86%**	≥ 80%	New measure

Strategic objective: reshaping ESR Science to provide integrated thought leadership in the health, environmental, and justice sectors

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
Percentage increase in SSIF investment in multi-disciplinary, cross-platform research projects from FY23 baseline	This measure demonstrates ESR's ability to take a holistic approach to solving problems by integrating innovation and thought leadership to detect issues, connect at the right time and protect communities. It also demonstrates ESR's ability to move from siloed thinking to greater collaboration internally and externally.	**10.8%**	>10%	Amended measure
Establish an integrated enterprise data science practice approach across ESR's science domains by 30 June 2024	An integrated data science practice and approach are critical for delivering fresh insights, closing knowledge gaps and creating opportunities for new research that will grow research excellence.	**Achieved**	Achieved	New measure

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
Number of international proposals submitted and accepted	This measure demonstrates ESR's collaboration and raises awareness of ESR on the international stage. The ability to successfully secure international funding for research will increase impact and develop transformative science.	**4**	≥ 3	Achieved
Overall success rate of external research bids	The ability to secure external funding is an indication of the quality and impact of ESR's research. Only the best applications are awarded funding. The success of this measure also indicates whether ESR's systems and processes adequately support ESR's scientists and science direction.	**Partially achieved***	≥ 15%	Achieved

* Two Endeavour Smart Ideas went forward to full application and one Research Programme bid went through to impact assessment. The success rate for bids in FY24 was 7.4 per cent, due to the number of bids submitted.

Strategic objective: recognition as an exemplar of a thriving people-centred workplace

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
Percentage of ESR's current permanent staff who have participated in a minimum of two foundational cultural capability courses	The purpose of this measure is to equip ESR's staff to be successful in developing culturally respectful and accountable practices.	**47.2%**	≥ 50%	Achieved
Establish employee diversity baseline and monitor	This measure will help provide evidence that ESR is committed to being a fair and equitable employer by ensuring that biases are identified and eliminated in the workplace. It will also provide insights into whether ESR's diversity initiatives or work programme is delivering results. This measure will form part of a further suite of measures to be developed that will provide insights into diversity and equity, including pay equity measures.	**In progress**	Improving against the established baseline	In progress

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
ESR's gender pay gap continues to reduce against the 2022 baseline of 15.6%	The purpose of this measure is to track the reduction in the gender pay gap as outlined in ESR's Kia Toipoto Action Plan.	**Achieved**	Improving against the established baseline	New measure
ESR continuously improves against the annual WorkSafe New Zealand SafePlus audit	This measure tracks ESR's health, safety and wellbeing maturity as assessed by an independent audit.	**Partially achieved***	Establish baseline	New measure

* ESR has scheduled its health and safety annual SafePlus performance self-assessment, associated with key elements: leadership, risk management, and worker engagement. These focus on an organisation's HSW capability in relation to a maturity scale.

Strategic objective: growing sustainable partnerships to provide innovative community focused science solutions/commercialisation

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
The portfolio of drugs able to be accurately detected by Lumi analysis increases	This measure ensures that the Lumi product increases its usefulness and commercial appeal through broader application of use.	**Partially achieved***	≥ 3	New measure
The accuracy rate of drugs detected by Lumi analysis increases through six-monthly performance updates	This measure ensures that the Lumi product increases its usefulness and commercial appeal through increased accuracy.	**2**	Two improved performance updates delivered to customers	New measure

* Development activities were reprioritised in response to customer demands and evaluation of opportunities. Heroin and ketamine models are anticipated to be launched early in 2024–2025 with development of new capabilities was progressed.

Strategic objective: strengthening business systems and processes to increase efficiency with regards to security, governance and sustainable activities

Performance measure	Measure purpose and intention	Actual 2024	Budget 2024	Actual 2023
ESR's cyber security maturing rating is maintained or enhanced	This is an enduring measure. ESR assesses its cyber security maturity rating across five areas: identify, protect, detect, respond and recover. Quarterly assessments are provided to the Board. The cyber security rating provided is the difference between two ratings at a point in time. The average percentage increase (or decrease) across the five criteria is reported as the score.	**Achieved**	Improving or maintained	Achieved
ESR's project governance and management practices are enhanced	This measure will help give ESR insight into how project management and governance practices are maturing as assessed against best practice.	**Achieved**	Establish baseline	New measure
ESR's total corporate emissions of CO_2e are effectively managed	The purpose of this measure is to track ESR's total CO_2e over time to identify whether ESR's sustainability initiatives are making a difference.	**Partially achieved***	Not increasing	Establish baseline

* Toitū certification was achieved for FY19, 20 and 21. The total emissions this year were 4,941.27 tCO2e, which is 5 per cent higher than last year's total of 4,713.87 tCO2e and 19 per cent lower than the base year total of 6,099.05 tCO2e. A reduction in emissions intensity of 10.44 tCO2e/$M has been achieved (based upon a three-year rolling average).

Part C: Financial performance and statements

Te whakahaere pūtea me ngā tauākī pūtea

Statement of responsibility

We certify that the Institute of Environmental Science and Research Limited (ESR) has operated in accordance with the principles of the Crown Research Institutes Act 1992 and the Companies Act 1993. ESR has also complied with all statutory environmental regulations. We acknowledge responsibility for the preparation of these financial statements and for the judgements used therein.

Internal control procedures are considered to be sufficient to provide reasonable assurance as to the integrity and reliability of the financial reports.

In our opinion these financial statements fairly reflect the financial position and operations of ESR for the year ended 30 June 2024.

Professor Sarah Young
Chair

Kate Thomson
Risk and Assurance Chair

Key financial performance measures

For the year ended 30 June 2024

	Actual 2024	Budget 2024	Actual 2023
Revenue	$134m	$131m	$124m
Operating margin	6.9%	6.2%	5.2%
Earnings before interest, tax, depreciation and amortisation (EBITDA) as a percentage of revenue			
Return on equity	3.5%	2.3%	0.1%
Net profit after taxation as a percentage of equity			
Return on assets	2.4%	1.4%	-0.5%
Earnings before interest and tax as a percentage of total assets			
Profit volatility	17%	33%	24%
The standard deviation of EBITDA as a percentage of average EBITDA over the preceding 7 years			
Acid test ratio	3.3	2.2	2.7
Current assets excluding prepayments and inventory to current liabilities excluding deferred revenue			
Equity ratio	59.8%	66.0%	56.6%
Equity as a percentage of total assets			
Gearing	4.3%	4.4%	5.7%
Debt (including lease liabilities) as a percentage of debt and equity			
Revenue per full time equivalent employee	$235,500	$238,000	$219,900
Operating margin per full time equivalent employee	$16,200	$14,800	$11,300
Earnings before interest, tax, depreciation and amortisation, per average full time equivalent employee for the year.			

Independent auditor's report

To the readers of the Institute of Environmental Science and Research Limited's Group financial statements for the year ended 30 June 2024.

The Auditor-General is the auditor of the Institute of Environmental Science and Research (ESR) and its controlled entities (the Group). The Auditor-General has appointed me, Sarah Turner, using the staff and resources of PricewaterhouseCoopers, 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 59 to 84, that comprise the Statement of Financial Position as at 30 June 2024, the Statement of Profit or Loss and Other Comprehensive Income, the Statement of Changes in Equity and the Statement of Cash Flows for the year ended on that date and the notes to the financial statements that include material accounting policies and other explanatory information.

In our opinion, the financial statements of the Group:

- present fairly, in all material respects:
  - its financial position as at 30 June 2024; 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 Accounting Standards.

Our audit was completed on 19 September 2024. 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) issued by the New Zealand Auditing and Assurance Standards Board. 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.

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.
- We obtain sufficient appropriate audit evidence regarding the financial statements of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the Group audit. We remain solely responsible for our audit opinion.

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 1 to 55 and 85 to 94 but does not include the financial statements, and our auditor's report thereon.

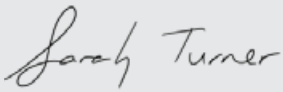
Our opinion on the financial statements does not cover the other information and we do not express any form of audit opinion or assurance conclusion thereon.

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 (including International Independence Standards) (New Zealand) (PES 1)* issued by the New Zealand Auditing and Assurance Standards Board.

In addition to the audit we have carried out another engagement in the area of a special purpose audit of the Schedule of Expenditures of Federal Awards for the year ended 30 June 2023 which is compatible with those independence requirements. Other than the audit and this engagement, we have no relationship with or interests in, the Group or any of its subsidiaries.



Sarah Turner
On behalf of the Auditor-General
Wellington, New Zealand

PricewaterhouseCoopers

Statement of profit or loss and other comprehensive income

For the year ended 30 June 2024

Group	Note	Group Actual 2024 $'000s	Group Budget 2024 unaudited $'000s	Group Actual 2023 $'000s
Revenue				
Revenue from contracts with customers	**2**	112,033	117,368	109,574
Government grants	**2**	21,499	13,830	13,996
		133,532	**131,198**	**123,570**
Operating expenses				
Scientific materials		9,103	12,450	10,873
Subcontracting, commissions and royalties		21,365	13,480	15,435
Personnel		72,277	71,632	68,989
Depreciation and amortisation	**5/6**	6,384	7,360	6,926
Other expenses	**3**	21,604	25,497	21,898
		130,733	**130,419**	**124,121**
Operating profit/(loss)		**2,799**	**779**	**(551)**
Interest income		2,288	1,456	1,224
Finance expense		(134)	(132)	(150)
		2,154	**1,324**	**1,074**
Profit before income tax expense		**4,953**	**2,103**	**523**
Income tax expense	**4**	2,626	589	439
Profit for the year attributable to the shareholders of the parent		**2,327**	**1,514**	**84**
Other comprehensive income		–	–	–
Total profit or loss and other comprehensive income for the year attributable to the shareholders of the parent		**2,327**	**1,514**	**84**

The accompanying notes form an integral part of these financial statements.

Statement of changes in equity

For the year ended 30 June 2024

Group	Note	Share capital $'000s	Retained earnings $'000s	Total equity $'000s
Balance at 30 June 2022		**8,494**	**52,128**	**60,622**
Profit for the year		–	84	84
Other comprehensive income		–	–	–
Total comprehensive income		**–**	**84**	**84**
Balance at 30 June 2023		**8,494**	**52,212**	**60,706**
Balance at 30 June 2023		**8,494**	**52,212**	**60,706**
Issue of new shares	**14**	10,000	–	10,000
Profit for the year		–	2,327	2,327
Other comprehensive income		–	–	–
Total comprehensive income		**–**	**2,327**	**2,327**
Balance at 30 June 2024		**18,494**	**54,539**	**73,033**

The accompanying notes form an integral part of these financial statements.

Statement of financial position

As at 30 June 2024

Group	Note	Group Actual 2024 $'000s	Group Budget 2024 unaudited $'000s	Group Actual 2023 $'000s
Non-current assets				
Property, plant and equipment	**5**	40,846	45,201	35,809
Right-of-use assets	**7**	3,122	3,030	3,563
Other investments		30	30	30
Investment cash	**8**	500	–	2,000
Intangible assets	**6**	4,716	8,716	4,627
Deferred taxation	**13**	339	2,129	1,509
		49,553	**59,106**	**47,538**
Current assets				
Cash and cash equivalents	**8**	13,857	4,164	12,546
Investment cash	**8**	39,255	28,250	28,500
Trade and other receivables	**9**	14,977	14,567	11,843
Contract assets	**2**	2,649	3,286	4,479
Inventories – scientific materials and consumables		999	1,157	1,060
Derivative financial instruments	**19**	–	–	28
Income tax receivable	**12**	900	–	1,211
		72,637	**51,424**	**59,667**
Current liabilities				
Trade and other payables	**10**	14,264	12,421	13,260
Contract liabilities	**2**	9,143	11,544	9,371
Government grants received in advance	**2**	14,013	2,001	10,942
Employee benefits	**11**	6,263	5,783	7,305
Lease liabilities	**7**	398	362	400
Derivative financial instruments	**19**	50	–	–
Income tax payable	**12**	–	586	–
		44,131	**32,697**	**41,278**
Net current assets		**28,506**	**18,727**	**18,389**

Statement of financial position (continued)

Group	Note	Group Actual 2024 $'000s	Group Budget 2024 unaudited $'000s	Group Actual 2023 $'000s
Non-current liabilities				
Employee benefits	**11**	2,163	2,140	1,962
Lease liabilities	**7**	2,863	2,948	3,259
		5,026	**5,088**	**5,221**
Net assets		**73,033**	**72,745**	**60,706**
Equity				
Share capital	**14**	18,494	18,494	8,494
Retained earnings		54,539	54,251	52,212
Total equity		**73,033**	**72,745**	**60,706**

The Board of Directors of the Institute of Environmental Science and Research Limited authorised these financial statements for issue on 19 September 2024.

On behalf of the Board:

Professor Sarah Young
Chair
19 September 2024

Kate Thomson
Risk and Assurance Chair
19 September 2024

The accompanying notes form an integral part of these financial statements.

Statement of cash flows

For the year ended 30 June 2024

Group	Note	Group Actual 2024 $'000s	Group Budget 2024 unaudited $'000s	Group Actual 2023 $'000s
Cash flows from/(used in) operating activities				
Cash was provided from:				
Customers and grants		135,481	131,092	133,910
Interest received		2,123	1,456	902
		137,604	**132,548**	**134,812**
Cash was applied to:				
Suppliers and employees		(124,432)	(127,882)	(117,106)
Interest paid		–	–	(4)
Income tax paid	**12**	(1,145)	(674)	(2,218)
		(125,577)	**(128,556)**	**(119,328)**
Net cash inflow from operating activities	**15**	**12,027**	**3,992**	**15,484**
Cash flows from/(used in) investing activities				
Cash was provided from:				
Investment cash maturities		31,030	24,250	33,523
		31,030	**24,250**	**33,523**
Cash was applied to:				
Purchase of property, plant and equipment		(9,277)	(18,992)	(10,270)
Purchase of intangible assets		(1,649)	(2,208)	(2,673)
Transfers to investment cash		(40,285)	(22,500)	(25,000)
		(51,211)	**(43,700)**	**(37,943)**
Net cash outflow from investing activities		**(20,181)**	**(19,450)**	**(4,420)**
Cash flows from/(used in) financing activities				
Cash was provided from:				
Capital contribution from the Crown	**14**	10,000	10,000	–
		10,000	**10,000**	**–**
Cash was applied to:				
Repayment of lease liabilities		(535)	(361)	(555)
		(535)	**(361)**	**(555)**
Net cash inflow/(outflow) from financing activities		**9,465**	**9,639**	**(555)**
Net increase/(decrease) in cash held		**1,311**	**(5,819)**	**10,509**
Cash and cash equivalents at the beginning of the year		12,546	9,983	2,037
Cash and cash equivalents at the end of the year	**8**	**13,857**	**4,164**	**12,546**

The accompanying notes form an integral part of these financial statements.

Notes to the financial statements

1. Statement of material accounting policies

Reporting entity

These financial statements of the Institute of Environmental Science and Research Limited and its subsidiaries ("ESR" and the "Group") are for the year ended 30 June 2024.

ESR is a Crown entity incorporated and based in New Zealand. Its registered office is 34 Kenepuru Drive, Porirua.

ESR is a Crown research institute that provides specialist scientific services and research to the public health, food safety, security and justice systems, and the environmental sector.

Statement of compliance

The financial statements have been prepared in accordance with the requirements of the Crown Entities Act 2004, the Crown Research Institute Act 1992, the Companies Act 1993 and the Financial Reporting Act 2013.

These financial statements have been prepared in accordance with Generally Accepted Accounting Practice in New Zealand (NZ GAAP). They comply with New Zealand equivalents to International Financial Reporting Standards (NZ IFRS), International Financial Reporting Standards Accounting Standards and other New Zealand accounting standards and authoritative notices as appropriate for for-profit entities.

Basis of preparation

The financial statements are prepared on the basis of historical cost, except for financial instruments and long service leave as identified in the specific accounting policies and accompanying notes.

The financial statements are presented in New Zealand dollars and all values are rounded to the nearest thousand dollars ($000).

The budget and target figures presented in these financial statements are unaudited.

Critical accounting estimates and judgements

The preparation of financial statements requires judgements, estimates and assumptions that affect the application of policies and reported amounts of assets and liabilities, income and expenses. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances. Actual results may differ from these estimates. The estimates and assumptions are reviewed on an on-going basis.

The decision to treat some property development expenditure as property, plant and equipment requires considerable judgement. For the 2024 financial year demolition costs have been treated as property, plant and equipment as these are considered to be directly attributed to the new building at the Kenepuru Science Centre. In previous years, judgement was required concerning the availability of resources required to complete the capital project.

The judgements that have the most significant effect on amounts recognised in the financial statements are applied in the carrying value of some items of property plant and equipment.

Government grants

Strategic science investment funding

ESR receives strategic science investment funding from the Government in order to perform scientific research activities. Strategic science investment funding is treated as a Government grant under NZ IAS 20. This is recognised in the statement of profit or loss on a systematic basis over the periods in which ESR recognises as expenses the related costs for which the grants are intended to compensate when the requirements under the funding agreement have been met.

ESR co-hosts the Infectious Disease Platform (Te Niwha) with University of Otago. This platform, which is also a Strategic science investment fund, is also treated as a Government grant under IAS 20 and is recognised gross in the statement of profit or loss for research into future infectious disease threats.

Ministry of Health

During the 2023 financial year, the Ministry of Health funded a refit of a sequencing lab and the purchase of items of scientific equipment to be used in relation to the response to COVID-19. This funding has been accounted for as a Government grant. There are no conditions or other contingencies attached to this grant, other than they are used in support of the Ministry's contracted services. The grant related to this purchase is recognised in government grants received in advance and will be credited to profit or loss on a straight-line basis over the expected lives of the related assets.

Inventories

Stocks of consumables and work in progress are stated at the lower of cost and net realisable value. Cost is determined on a first in, first out basis.

Interest income

Interest income is recognised in the statement of profit or loss and other comprehensive income on a time proportion basis, using the effective interest rate method.

Foreign currency

Items included in the financial statements of each of the Group's entities are measured using the currency of the primary economic environment in which the entity operates. The Group financial statements are presented in New Zealand dollars, which is ESR's functional currency.

Foreign currency transactions are recorded at the foreign exchange rates in effect at the dates of the transactions. Monetary assets and monetary liabilities denominated in foreign currencies are translated at the rates of exchange ruling at the end of each reporting period.

Other accounting policies

Other material accounting policies adopted in the preparation of these financial statements are provided throughout the notes to the financial statements.

Changes to accounting policies

There have been no changes to accounting policies which have been applied on a basis consistent with prior year.

Adoption status of relevant new financial reporting standards and interpretations

In May 2024, the XRB introduced NZ IFRS 18 Presentation and Disclosure in Financial Statements (NZ IFRS 18) (effective for annual reporting periods beginning on or after 1 January 2027). This standard replaces NZ IAS 1 Presentation of Financial Statements (NZ IAS 1) and primarily introduces a defined structure for the statement of profit and loss and other comprehensive income, disclosure of management-defined performance measures (a subset of non-GAAP measures) in a single note together with reconciliation requirements. The Group has not early adopted this standard and is yet to assess its impacts.

2. Revenue

a. Revenue from contracts with customers

Revenue from contracts with customers is recognised when control of the goods or services is transferred to the customer at an amount that reflects the consideration to which the Group expects to be entitled in exchange for those goods or services.

For some contracts, revenue is recognised based on the actual service provided to the end of the reporting period as a proportion of the total services to be provided, as the customer receives and uses the benefits simultaneously or the Group has an enforceable right to payment for performance completed to date. The revenue recognised is typically determined based on actual labour hours and other costs incurred.

Estimates of revenues, cost or extent of progress toward completion are revised if circumstances change. Any resulting increases or decreases in estimated revenues or costs are reflected in profit or loss in the period in which the circumstances that give rise to the revision become known by management.

In case of fixed-price contracts, the customer pays the fixed amount based on payment schedule. If the services rendered by the Group exceed the payment schedule, a contract asset is recognised. If the payments exceed the services rendered, a contract liability is recognised.

Sale of software

The Group sells expert forensic analysis software. Contracts for the sale of this software comprise several deliverables: software license, software upgrades, training and support.

Revenue for each deliverable is recognised as the related performance obligation is satisfied, either at a point in time or over time. Revenue from software licenses and training is recognised at a point in time when, respectively, the customer has been provided with access to the software licenses and training has been delivered. Software upgrades and support revenues are recognised over time. Software upgrade revenue is recognised over time as the Group has a stand ready obligation to provide software upgrades and enhancements as and when they are available. Software support revenue is recognised as the customer utilises the support purchased with the software license.

Invoicing or payment for software upgrades and support is generally made in advance of the satisfaction of these performance obligations. A contract liability is recognised to the extent payment received or due exceeds the services rendered by the Group.

The transaction price is allocated to each performance obligation based on the standalone selling price or estimated based on industry benchmarks.

Satisfaction of performance obligations

Revenue for contract deliverables is recognised as the related performance obligation is satisfied, either at a point in time or over time.

The Group has determined that the various deliverables included within a contract for the sale of forensic analysis software are capable of being distinct.

For the majority of other contract deliverables, the Group has concluded that the satisfaction of performance obligations occurs over time. In these circumstances the Group has determined that an input method is most appropriate in measuring progress on a contract as there is a direct relationship between the Group's effort (i.e. labour hours and other costs incurred) and the transfer of services to the customer. In these circumstances the Group recognises revenue on the basis of labour hours expended and other costs incurred, relative to the total expected cost to complete the service.

Revenue from the balance of commercial and research activities is recognised at a point in time. This is the point at which the Group has determined it has transferred control of the related goods or services to the customer.

i. Disaggregated revenue information

Group – year ended 30 June 2024	Domestic $'000s	International $'000s	Total $'000s
Core government contracts	85,506	–	85,506
Research	2,918	4,210	7,128
Commercial products and services	5,096	14,303	19,399
	93,520	**18,513**	**112,033**

Group – year ended 30 June 2023	Domestic $'000s	International $'000s	Total $'000s
Core government contracts	76,530	–	76,530
Research	7,775	4,116	11,891
Commercial products and services	6,860	14,293	21,153
	91,165	**18,409**	**109,574**

Note that the overall research output of the Group includes activity funded by $21,499,000 (2023: $13,996,000) of Strategic Science Investment Funding. This funding is accounted for as a government grant and not included in the table above.

ii. Remaining performance obligations

The transaction price for bundled deliverables associated with software license sales is allocated to each performance obligation based on the standalone selling price or estimated based on industry benchmarks.

The transaction price allocated to the remaining performance obligations (unsatisfied or partially unsatisfied) was $11,339,000 as at 30 June 2024 (2023: $17,179,000), split between current and non-current as below:

	2024 $'000s	2023 $'000s
Current	9,655	14,787
Non-current	1,684	2,392
	11,339	**17,179**

The remaining performance obligations expected to be recognised in more than one year relate to multi-year research projects to be completed over the next five years, and prepaid software upgrades. All other remaining performance obligations are expected to be recognised within one year.

The balance of current remaining performance obligations does not include obligations under contracts for periods of one year or less.

iii. Contract balances

Principal versus agent considerations

The Group has concluded that it is the principal in its revenue arrangements as it controls the goods or services before they are transferred to the customer.

Variable consideration

Where the consideration in a contract includes a variable amount arising from a value-based rebate, the Group estimates the amount of consideration to which it will be entitled in exchange for transferring the goods or services to the customer. The Group applies the most likely amount method to determine the amount to which it will ultimately be entitled.

Financing components

The Group does not have any contracts where the period between the transfer of the promised goods or services to the customer and payment by the customer exceeds one year. As a consequence, the Group does not adjust any of the transaction prices for the time value of money.

Group	2024 $'000s	2023 $'000s
Trade receivables	12,338	9,452
Contract assets	2,649	4,479
Contract liabilities	9,143	9,371
Government grants received in advance	14,013	10,942

Trade receivables are non-interest bearing and generally on terms of 30 to 90 days.

Contract assets comprise revenue due from customers and capitalised costs of obtaining contracts for software sales:

- Revenue due from customers are balances recognised for services rendered where receipt of consideration is dependent on the completion of a project milestone and acceptance by the customer. Amounts initially recognised as contract assets are reclassified as trade receivables as milestones are completed and invoicing agreed with the customer.
- Incremental costs of obtaining contracts for software sales are $6,000 as at 30 June 2024 (2023: $40,000). These costs are initially capitalised and then amortised systematically as the related performance obligation is satisfied. Amortisation recognised in 2024 was $2,569,000 (2023: $2,344,000).

Contract liabilities represent amounts relating to research projects and software sales and support where the payment received or due under the contract precedes the satisfaction of performance obligations by the Group. Contract liabilities are recognised as revenue when these performance obligations are satisfied.

The Group recognised revenue of $11,922,000 (2023: $4,798,000) during the year that was included in contract liabilities at the beginning of the period. No revenue was recognised in the year from performance obligations partially or fully satisfied in prior years.

b. Government grants

During the year ESR received Government grants of $12,500,000 (2023: $8,000,000) relating to the Infectious Disease Platform (Te Niwha) out of which $10,689,000 (2023: $7,446,000) is recognised as Government grants received in advance as at 30 June 2024.

In 2023 ESR received $3,495,000 (2024: nil) from the Ministry of Health for a sequencing laboratory refit. This grant will be recognised as income in equal amounts over the expected useful life of the asset. The sequencing lab refit as at 30 June 2023 was recorded within assets under construction, this was capitalised in 2024. The balance of the grant received in advance as at 2024 was $3,324,000.

3. Other expenses

Group	Note	2024 $'000s	2023 $'000s
Communication costs (including network charges)		429	283
Depreciation expense on right-of-use assets		443	410
Directors' expenses		27	32
Directors' fees	**18**	320	184
Fair value (gain) on forward exchange contract		78	(60)
Fees paid to PricewaterhouseCoopers for:			
• the audit of the statutory financial statements		278	258
• other assurance services		44	47
IT systems maintenance and licence costs		4,008	4,517
Legal and consulting fees		1,955	2,326
Occupancy and insurance		4,844	4,101
Office and administration		2,253	2,471
Other operating costs		632	739
Outsourced costs		3,741	4,087
Rental and lease costs		285	320
Restructuring expense		139	141
(Reversal of impairment)/impairment of receivables		4	(42)
Travel		2,124	2,084
Total other expenses		**21,604**	**21,898**

Given the nature of ESR's principal business activities, research comprises part of ESR's everyday business operations. As such, expenses relating to research are not separately identified. The cost of research to ESR is distributed between the relevant expense items, for example employee benefits and scientific materials used.

Other assurance services in 2024 relate to the special purpose audit of the Schedule of Expenditures of Federal Awards for the year ended 30 June 2023, and services in 2023 relate to the Group's Report of Federal Awards in accordance with the OMB Uniform Guidance Program Provisions for the year ended 30 June 2022.

4. Taxation

Group	Note	2024 $'000s	2023 $'000s
The taxation charge has been calculated as follows:			
Profit before income tax expense		**4,953**	**523**
Prima facie taxation at 28%		1,387	146
Plus taxation effect of:			
Effect of removal of tax depreciation on buildings		1,100	–
Net prior period adjustments		114	251
Non-deductible items		25	42
Tax expense for the year		**2,626**	**439**
The tax expense for the year is represented by:			
Current taxation	**12**	1,456	205
Deferred taxation	**13**	1,170	234
Tax expense for the year		**2,626**	**439**

5. Property, plant and equipment

Items of property, plant and equipment are initially recorded at cost and subsequently at cost less accumulated depreciation and impairment. The cost of property, plant and equipment includes the value of consideration given to acquire the assets and the value of other directly attributable costs that have been incurred in bringing the assets to the location and condition necessary for their intended use.

The carrying amounts of property, plant and equipment are reviewed at least annually to determine if there is any indication of impairment. Where an asset's recoverable amount is less than its carrying amount, it will be reported as its recoverable amount and an impairment loss will be recognised.

Losses resulting from impairment are reported in profit or loss.

Realised gains and losses arising from the disposal of property, plant and equipment are recognised in the profit or loss in the periods in which the transactions occur.

Depreciation is charged on a straight-line basis at rates calculated to allocate the cost of an item of property, plant and equipment, less any estimated residual value, over its estimated useful life, as follows:

Type of Asset	Estimated useful life
Land	Not depreciated
Freehold buildings and building fit out	1– 65 years
Leasehold Improvements	10 years
Plant, equipment and vehicles	3 –10 years
IT equipment	3 –12 years

Group	Freehold land $'000s	Buildings and leasehold improvements $'000s	IT equipment $'000s	Plant, equipment and vehicles $'000s	Assets under construction $'000s	Total $'000s
At 1 July 2022						
Cost	476	34,277	9,052	39,871	3,297	86,973
Accumulated depreciation	–	(18,077)	(7,114)	(32,400)	–	(57,591)
Net book value at the end of the year	**476**	**16,200**	**1,938**	**7,471**	**3,297**	**29,382**
Year ended 30 June 2023						
Net book value at the beginning of the year	476	16,200	1,938	7,471	3,297	29,382
Additions	–	245	1,013	2,197	8,165	11,620
Transfers from assets under construction	–	407	181	–	(588)	–
Disposals	–	(30)	(14)	(56)	–	(100)
Depreciation for the year	–	(1,814)	(1,359)	(1,920)	–	(5,093)
Net book value at the end of the year	**476**	**15,008**	**1,759**	**7,692**	**10,874**	**35,809**
As at 30 June 2023						
Cost	476	34,836	10,038	41,586	10,874	97,810
Accumulated depreciation	–	(19,828)	(8,279)	(33,894)	–	(62,001)
Net book value at the end of the year	**476**	**15,008**	**1,759**	**7,692**	**10,874**	**35,809**
Year ended 30 June 2024						
Net book value at the beginning of the year	476	15,008	1,759	7,692	10,874	35,809
Additions	–	1,794	865	2,144	5,184	9,987
Transfers from assets under construction	–	3,844	–	96	(3,940)	–
Disposals	–	(44)	(4)	(81)	–	(129)
Depreciation for the year	–	(1,851)	(1,091)	(1,879)	–	(4,821)
Net book value at the end of the year	**476**	**18,751**	**1,529**	**7,972**	**12,118**	**40,846**
As at 30 June 2024						
Cost	476	39,954	9,932	41,908	12,118	104,388
Accumulated depreciation	–	(21,203)	(8,403)	(33,936)	–	(63,542)
Net book value at the end of the year	**476**	**18,751**	**1,529**	**7,972**	**12,118**	**40,846**

ESR does not have any property, plant and equipment used as security for liabilities.

ESR has approval to redevelop the Kenepuru Science Centre. The useful life of the existing building and plant assets at this site has been reassessed and the Group is accelerating depreciation on these assets to between 1 and 5 years.

Design costs as well as initial demolition and pre-construction costs associated with the redevelopment of the Kenepuru Science Centre are included within assets under construction.

There have been no indications of impairment.

Restriction on title

In relation to the transfer of land owned by ESR, shareholding ministers shall have regard to the principles of the Te Tiriti o Waitangi in accordance with section 10 of the Crown Research Institutes Act 1992.

Properties owned by ESR in Christchurch, Wellington and Auckland have caveats on the land as required by section 31 of the Crown Research Institutes Act 1992, which maintains the general provisions of the Public Works Act 1981. ESR complies with section 31 of the Crown Research Institutes Act 1992.

6. Intangible assets

Computer software

Items of computer software that do not comprise an integral part of the related hardware are treated as intangible assets with finite lives. Intangible assets with finite lives are recorded at cost, and subsequently recorded at cost less any accumulated amortisation and impairment losses. Amortisation is charged to the statement of profit or loss and other comprehensive income on a straight-line basis over the useful life of the net asset (between 3 and 12 years).

Customer contracts

The intangible asset customer contracts present the fair value of future revenue streams from customer contracts acquired under business combinations. Initial recognition of the intangible asset is stated at fair value. Subsequent to initial recognition, acquired intangible assets are stated at initially recognised amounts less accumulated amortisation and any impairment. Amortisation of acquired intangible assets is made according to the straight-line method over their estimated useful life, not exceeding 10 years.

Research and development costs – internally generated intangible assets

Expenditure on research is expensed when it is incurred.

Development expenditure incurred on an individual project is capitalised if the process is technically and commercially feasible, future economic benefits are probable and ESR intends to, and has sufficient resources to, complete development and to use or sell the asset.

Any expenditure capitalised is amortised over three years from the point the asset is ready to use, which is the point of expected future sales from the related project.

Software-as-a-Service arrangements

Software-as-a-Service (SaaS) arrangements are service contracts providing the Group with the right to access the cloud provider's application software over the contract period. Costs incurred to configure or customise, and the ongoing fees to obtain access to the cloud provider's application software, are recognised as operating expenses when the services are received.

Some of these costs incurred are for the development of software code that enhances or modifies, or creates additional capability to, existing on-premise systems and meets the definition of and recognition criteria for an intangible asset. These costs are recognised as intangible software assets and amortised over the useful life of the software on a straight-line basis. The useful lives of these assets are reviewed at least at the end of each financial year, and any change accounted for prospectively as a change in accounting estimate.

There are no intangible assets recognised under SaaS arrangement for the current year (2023: Nil).

Impairment of non-financial assets

Intangible assets that have an indefinite useful life or intangible assets not yet ready to use are not subject to amortisation and are tested annually for impairment.

Assets that are subject to depreciation and amortisation are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognised for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs to sell and its value in use. For the purposes of assessing impairment, assets are grouped at the lowest levels for which they are separately identifiable cash flows (cash-generating units).

Group	Computer software – externally purchased $'000s	Computer software – internally generated $'000s	Customer Contracts $'000s	Assets under construction $'000s	Total $'000s
At 1 July 2022					
Cost	4,942	16,058	1,338	1,192	23,530
Accumulated amortisation and impairment losses	(4,867)	(12,346)	(1,338)	–	(18,551)
Net book value at the end of the year	**75**	**3,712**	**–**	**1,192**	**4,979**
Year ended 30 June 2023					
Net book value at the beginning of the year	75	3,712	–	1,192	4,979
Additions	81	421	–	979	1,481
Transfers from assets under construction	–	986	–	(986)	–
Amortisation for the year	(68)	(1,765)	–	–	(1,833)
Net book value at the end of the year	**88**	**3,354**	**–**	**1,185**	**4,627**
As at 30 June 2023					
Cost	5,023	17,465	1,338	1,185	25,011
Accumulated amortisation and impairment losses	(4,935)	(14,111)	(1,338)	–	(20,384)
Net book value at the end of the year	**88**	**3,354**	**–**	**1,185**	**4,627**
Year ended 30 June 2024					
Net book value at the beginning of the year	88	3,354	–	1,185	4,627
Additions	8	530	–	1,115	1,653
Transfers from assets under construction	–	896	–	(896)	–
Disposals	(1)	–	–	–	(1)
Amortisation for the year	(42)	(1,521)	–	–	(1,563)
Net book value at the end of the year	**53**	**3,259**	**–**	**1,404**	**4,716**
As at 30 June 2024					
Cost	5,027	18,891	1,338	1,404	26,660
Accumulated amortisation and impairment losses	(4,974)	(15,632)	(1,338)	–	(21,944)
Net book value at the end of the year	**53**	**3,259**	**–**	**1,404**	**4,716**

ESR does not have any intangible assets for which title is restricted or used as security for liabilities.

Intangible assets include ESR's laboratory operating system with a net book value of $1,099,528 (2023: $1,579,104). The laboratory operating system has an estimated remaining useful life of three years (2023: four years).

7. Leases

The Group assesses at contract inception whether a contract is, or contains, a lease. That is, if the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration.

The Group applies a single recognition and measurement approach for all leases, except for short-term leases and leases of low-value assets. The Group recognises lease liabilities to make lease payments and right-of-use assets representing the right to use the underlying assets.

Right-of-use assets

The Group recognises right-of-use assets at the commencement date of the lease (i.e. the date the underlying asset is available for use). Right-of-use assets are measured at cost, less any accumulated depreciation and impairment losses, and adjusted for any remeasurement of lease liabilities. The cost of right-of-use assets includes the amount of lease liabilities recognised, initial direct costs incurred and lease payments made at or before the commencement date less any incentives received. The recognised right-of-use assets are depreciated on a straight-line basis over the shorter of its estimated useful life and the lease term. Right-of-use assets are subject to impairment.

Lease liabilities

At the commencement date of the lease, the Group recognises the lease liabilities measured at the present value of lease payments to be made over the lease term.

In determining the non-cancellable term of a lease, the Group considers all relevant facts and circumstances that create an economic incentive for the lessee to either exercise an option to extend a lease or to terminate the lease.

In calculating the present value of lease payments, the Group uses the incremental borrowing rate at the lease commencement date if the interest rate implicit in the lease is not readily determinable. After the commencement date, the amount of lease liabilities is increased to reflect the accretion of interest and reduced for the lease payments made. In addition, the carrying amount of lease liabilities is remeasured if there is a modification, a change in the lease term or a change in the in-substance fixed lease payments.

Amounts recognised in the statement of financial position and statement of profit or loss and other comprehensive income

	Right-of-use assets			
	Buildings $'000s	**Motor vehicles $'000s**	**Total $'000s**	**Lease liabilities $'000s**
At 1 July 2022	3,754	90	3,844	3,883
Additions and modifications to contracts	113	16	129	183
Depreciation expense	(372)	(38)	(410)	–
Interest expense	–	–	–	148
Payments	–	–	–	(555)
As at 30 June 2023	**3,495**	**68**	**3,563**	**3,659**

	Right-of-use assets			
	Buildings $'000s	**Motor vehicles $'000s**	**Total $'000s**	**Lease liabilities $'000s**
At 1 July 2023	3,495	68	3,563	3,659
Additions and modifications to contracts	2	–	2	2
Depreciation expense	(403)	(40)	(443)	–
Interest expense	–	–	–	135
Payments	–	–	–	(535)
As at 30 June 2024	**3,094**	**28**	**3,122**	**3,261**

The maturity of the lease liabilities is as follows:

	2024 $'000s	2023 $'000s
Less than one year	398	400
One to five years	2,863	3,259
Total lease liabilities	**3,261**	**3,659**

8. Cash, cash equivalents and investment cash

	2024 $'000s	2023 $'000s
Total cash and cash equivalents	**13,857**	**12,546**
Investment cash current	39,255	28,500
Investment cash non-current	500	2,000
Total investment cash	**39,755**	**30,500**

Within the cash and cash equivalent balance includes $5,580,000 (2023: $8,024,000) and within investment cash current includes $3,000,000 (2023: nil) relating to Te Niwha funding designated account which is not restricted.

9. Trade and other receivables

Trade and other receivables are recognised initially at fair value and subsequently measured at amortised cost using the effective interest method, less any provision for impairment.

Collectability of receivables is reviewed on an ongoing basis. An allowance for expected credit losses is established from day one in the acknowledgement that the expected credit losses model assumes that there are very limited circumstances under which a debt has no risk (implying a nil provision is not appropriate). Bad debts are written off in the period in which they are identified.

Group	2024 $'000s	2023 $'000s
Trade debtors	12,377	9,487
Allowance for expected credit losses	(39)	(35)
	12,338	**9,452**
Prepayments	2,639	2,391
Total trade and other receivables	**14,977**	**11,843**

As at 30 June 2024, trade receivables of $4,488,000 (2023: $2,416,000) were past due but not impaired. These relate to a number of customers for whom there is no recent history of default. The ageing analysis of these trade receivables is as follows:

Group	2024 $'000s	2023 $'000s
Past due 1–30 days	2,145	1,193
Past due 31–60 days	550	500
Past due >61 days	1,793	723
Total past due trade receivables	**4,488**	**2,416**

10. Trade and other payables

Trade payables are obligations to pay for goods or services that have been acquired in the ordinary course of business from suppliers. Accounts payable are classified as current liabilities if payment is due within one year or less. If not, they are presented as non-current liabilities. Trade payables are recognised initially at fair value and subsequently at amortised cost using the effective interest method.

Goods and Services Tax

Items in the statement of profit or loss and other comprehensive income and statement of cash flows are disclosed net of Goods and Services Tax (GST). All items in the statement of financial position are stated net of GST with the exception of receivables and payables, which include GST invoiced.

Group	2024 $'000s	2023 $'000s
Accrued expenses	4,596	2,734
GST payable	861	170
Trade payables	8,807	10,356
Total trade and other payables	**14,264**	**13,260**

11. Employee benefits

Wages, salaries and annual leave

Liabilities for wages and salaries including annual leave that are expected to be settled within 12 months of the reporting date are recognised in respect of employees' services up to the reporting date and are measured at the amounts expected to be paid when the liabilities are settled.

Obligations for contributions to defined contribution retirement plans are recognised as an expense in the statement of profit or loss and other comprehensive income as they fall due.

Long service leave and retirement leave

Liabilities for long service leave and retirement leave are recognised as employee benefit liabilities and measured as the present value of expected future payments to be made in respect of services provided by employees up to the reporting date. Consideration is given to the expected future salary levels, experience of employee departures and periods of service. Expected future payments are discounted using market yields at the reporting date for government bonds with terms to maturity and currency that match, as closely as possible, the estimated future cash outflows.

Group	2024 $'000s	2023 $'000s
Annual leave accrual	5,972	5,776
Service leave accrual	270	403
Other	21	1,126
Total current employee benefits	**6,263**	**7,305**
Service leave accrual	2,125	1,889
Retirement leave accrual	38	73
Total non-current employee benefits	**2,163**	**1,962**

12. Income tax (receivable)/payable

Current tax is calculated with reference to the current period's taxable profit or loss calculated using tax rates and tax laws that have been enacted or substantially enacted by reporting date. Current tax for the current and prior periods is recognised as a liability (or asset) to the extent that it is unpaid (or refundable).

Group	2024 $'000s	2023 $'000s
Balance at the beginning of the year	(1,211)	802
Current year charge	1,528	991
Prior period adjustment	(72)	(786)
Provisional taxation payments	(1,145)	(2,218)
Total income tax (receivable)/payable	**(900)**	**(1,211)**

13. Deferred taxation

Deferred tax is calculated 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 tax base for those terms.

Deferred tax assets and liabilities are not recognised if the temporary differences giving rise to them from the initial recognition of assets and liabilities (other than as a result of a business combination) affects neither taxable income nor accounting profit.

Deferred tax assets are recognised for deductible temporary differences and unused tax losses only if it is probable that future taxable amounts will be available against which deductible temporary differences or unused tax losses and tax offsets can be utilised.

Deferred tax assets and liabilities are measured at the tax rates expected to apply when the assets are recovered or liabilities settled using tax rates and tax laws that have been enacted or substantially enacted by the reporting date.

Group	2024 $'000s	2023 $'000s
Balance at the beginning of the year	(1,509)	(1,743)
Effect of removal of tax depreciation on buildings	1,100	–
Prior period adjustment	188	1,029
Charge to settlement of profit or loss and other comprehensive income	(118)	(795)
Total deferred taxation liability/(asset)	**(339)**	**(1,509)**

	Accelerated tax depreciation $'000s	Employee benefits $'000s	Provisions and other items $'000s	Total $'000s
Year ended 30 June 2023				
Balance at the beginning of the year	1,628	(2,276)	(1,095)	(1,743)
Under provision in prior years	(3)	–	1,032	1,029
Current year credit to statement of profit or loss and other comprehensive income	(560)	(230)	(5)	(795)
Total deferred taxation liability/(asset)	**1,065**	**(2,506)**	**(68)**	**(1,509)**
Year ended 30 June 2024				
Balance at the beginning of the year	1,065	(2,506)	(68)	(1,509)
Effect of removal of tax depreciation on buildings	1,100	–	–	1,100
Under provision in prior years	188	–	–	188
Current year credit to statement of profit or loss and other comprehensive income	(379)	276	(15)	(118)
Total deferred taxation liability/(asset)	**1,974**	**(2,230)**	**(83)**	**(339)**

There are no unrecognised deferred tax assets or liabilities.

In March 2024, the New Zealand Government enacted the Taxation (Annual Rates for 2023–24, Multinational Tax and Remedial Matters) Bill. As a result, from the 2024–25 income tax year onwards, the Group can no longer claim any tax depreciation on their building with estimated useful lives of 50 years or more in New Zealand. The Group assessed the accounting impact of this change, which resulted in an increased deferred tax liability recognised on plant, property and equipment.

14. Equity

Share capital

Ordinary shares are classified as equity. Incremental costs directly attributable to the issue of new shares or options are shown as appropriate in equity as a deduction, net of tax, from the proceeds.

Dividends

A provision is made for the amount of any dividend declared on or before the end of the financial year but not distributed at balance date.

Share capital Group	2024 $'000s	2023 $'000s
18,494,000 (2023: 8,494,000) ordinary $1 shares (issued and fully paid)	18,494	8,494

All ordinary shares rank equally with one vote attached to each fully paid ordinary share.

The increase in share capital this year relates to first of two capital contributions from the Crown amounting to $10m; comprising 10,000,000 ordinary shares of $1.00 each. The second capital injection of $15m comprising 15,000,000 ordinary shares of $1.00 each have been issued and are receivable in the next financial year. The purpose of the $25m capital injection is to provide funding to progress the build of the new Kenepuru Science Centre.

No dividends were proposed or declared for the 30 June 2024 year (2023: nil).

15. Reconciliation of profit after taxation to cash flows from operating activities

Cash and cash equivalents

Cash means cash on hand, demand deposits and other highly liquid investments in which ESR has invested as part of its day-to-day cash management. The following definitions are used in the statement of cash flows:

- Investing activities are those relating to the acquisition, holding and disposal of fixed assets and investments.
- Financing activities are those activities that result in changes in the size and composition of the capital structure of ESR and this includes both equity and debt not falling within the definition of cash. Dividends paid in relation to the capital structure are included in financing activities.
- Operating activities are the principal revenue producing activities and other activities that are not investing and financing activities.

Investment cash

Investment cash represents cash held in bank deposits with original maturities greater than three months. Investment cash movements are included in investing activities in the statement of cash flows.

Group	Note	2024 $'000s	2023 $'000s
Profit for the year after taxation		**2,327**	**84**
Non-cash items:			
Depreciation and amortisation expense	**5/6**	6,384	6,926
Depreciation on right-of-use assets	**7**	443	410
Gain on modification of lease contracts	**7**	2	–
Decrease in allowance for expected credit losses	**9**	(4)	(42)
Decrease in deferred tax asset	**13**	1,170	234
Fair value loss/(gain) on derivative financial instruments		78	(43)
Other non-cash items		(3)	1
		8,070	**7,486**
Changes in working capital:			
Increase in trade and other receivables and contract assets		(1,300)	(2,222)
Decrease/(increase) in inventories		61	(25)
Increase in trade and other payables and contract liabilities		776	412
Increase in government grants received in advance		3,071	10,942
Decrease/(increase) in income tax receivable		311	(2,013)
(Decrease)/increase in employment benefits		(841)	677
		2,078	**7,771**
Items classified as investing and financing activities:			
Loss on disposal of property, plant and equipment		61	39
Decrease in trade payables related to property, plant and equipment		(644)	(44)
Finance charge on leases		135	148
		(448)	**143**
Net cash inflow from operating activities		**12,027**	**15,484**

16. Investments

Subsidiaries

The consolidated financial statements incorporate the assets and liabilities of all subsidiaries of ESR as at 30 June 2024 and the results of the operations of all subsidiaries for the year then ended.

Subsidiaries are those entities controlled, directly or indirectly, by the Parent. Subsidiaries are consolidated from the date on which control is transferred to ESR. They are de-consolidated from the date that control ceases.

The acquisition method of accounting is used to account for the acquisition of business by the Group. The cost of an acquisition is measured as the fair value of the assets given, equity instruments issued and liabilities incurred or assumed at the date of exchange. Identifiable assets acquired and liabilities and contingent liabilities assumed in a business combination are measured initially at their fair values at the acquisition date, irrespective of the extent of any non-controlling interest. The excess of the cost over the fair value of the Group's share of the identifiable net assets acquired is recorded as goodwill. If the cost of acquisition is less than the Group's share of the fair value of the identifiable net assets of the subsidiary acquired, the difference is recognised directly in the profit or loss.

ESR has two wholly owned subsidiary companies:

Name	Balance Date	Country of Incorporation
ESR Limited	30 June	New Zealand
STRmix Limited	30 June	New Zealand

ESR's financial statements include the financial statements of ESR and entities controlled by ESR. All intra-group transactions balances, income and expenses are eliminated in full on consolidation.

No stake in any subsidiary was acquired or disposed of during the year.

17. Commitments

Capital commitments

Group	2024 $'000s	2023 $'000s
Property, plant and equipment	77,310	1,077
Intangible assets – software	114	163
Total capital commitments	**77,424**	**1,240**

ESR has a number of standard operational agreements for the purchase of materials and consumables that have both fixed and variable components, some of which extend beyond one year.

The Property, plant and equipment commitment amount in 2024 includes contracts relating to the redevelopment of the Kenepuru Science Centre.

18. Related party transactions and key management personnel

Related party transactions

ESR is a wholly owned entity of the Crown. ESR receives Strategic Science Investment Funding from the Government and enters into transactions with other Crown entities on a commercial basis. In the year ended 30 June 2024 revenue from commercial transactions with Crown entities amounted to 79 per cent of operating revenue (30 June 2023: 82 per cent).

The following transactions were carried out by ESR with related parties:

- Fees paid to directors during the year were $319,711 (30 June 2023: $183,740).
- During the 2024 financial year, ESR purchased services of $26,400 (2023: $42,900) from Ihu Pakiri Limited, a company of which a member of the ESR Senior Leadership Team is a director. The services purchased related to te reo and tikanga Māori learning.

No provision has been required, nor any expense recognised, for impairment of receivables from related parties.

Key management personnel compensation

Key management personnel comprise the Chief Executive Officer, senior management and the directors. Key management personnel compensation is disclosed below:

Group	2024 $'000s	2023 $'000s
Salaries and other short-term employee benefits	3,409	3,030
Directors' fees	320	184
Total key management personnel compensation	**3,729**	**3,214**

19. Financial instruments by category

The designation of financial assets and financial liabilities by ESR into instrument categories is determined by the business purposes of the financial instruments, policies and practices, the relationship with other instruments and the reporting costs and benefits associated with each designation.

Financial assets

The Group classifies its financial assets either at amortised cost or at fair value through profit or loss. ESR determines the classification of its financial assets at initial recognition.

Financial assets at amortised cost are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. They are included in current assets, except for maturities greater than 12 months after the reporting date, which are classified as non-current assets. ESR's financial assets at amortised cost comprise trade and other receivables, investment cash, and cash and cash equivalents in the statement of financial position.

Regular purchases and sales of financial assets are recognised on the trade-date – the date on which the Group commits to purchase or sell the asset. Financial assets are derecognised when the rights to receive cash flows from the investments have expired or have been transferred and the Group has transferred substantially all risks and rewards of ownership. Financial assets at amortised cost use the effective interest method.

The Group recognises an allowance for expected credit losses (ECLs) for all financial assets at amortised cost or for all financial assets not at fair value through profit or loss. ECLs are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that the Group expects to receive, discounted at an approximation of the original effective interest rate.

Non-derivative financial liabilities

Financial liabilities held by ESR include trade and other payables, employee benefits and lease liabilities.

Such financial liabilities are recognised initially at fair value less transaction costs and subsequently measured at amortised cost using the effective interest rate method.

Derivatives

Derivative financial instruments are recognised both initially and subsequently at fair value. They are reported as either assets or liabilities depending on whether the derivative is in a net gain or net loss position. ESR does not use hedge accounting and as such derivatives are classified as held-for-trading financial instruments with fair value gains or losses recognised in profit or loss. Such derivatives are entered into for risk management purposes.

Group	Note	Financial assets at amortised cost $'000s	Financial assets at fair value through profit or loss $'000s	Total $'000s
30 June 2024				
Assets as per balance sheet				
Trade and other receivables excluding prepayments	**9**	12,338	–	12,338
Cash and cash equivalents		13,857	–	13,857
Investment cash		39,755	–	39,755
Derivative financial instruments		–	–	–
Total		**65,950**	**–**	**65,950**

		Financial liabilities at amortised cost $'000s	Financial liabilities at fair value through profit or loss $'000s	Total $'000s
Liabilities as per balance sheet				
Employee benefits		8,426	–	8,426
Trade payables and accrued expenses	**10**	13,403	–	13,403
Lease liabilities	**7**	3,261	–	3,261
Derivative financial instruments		–	50	50
Total		**25,090**	**50**	**25,140**

Group	Note	Financial assets at amortised cost $'000s	Financial assets at fair value through profit or loss $'000s	Total $'000s
30 June 2023				
Assets as per balance sheet				
Trade and other receivables excluding prepayments	**9**	9,452	–	9,452
Cash and cash equivalents		12,546	–	12,546
Investment cash		30,500	–	30,500
Derivative financial instruments		–	28	28
Total		**52,498**	**28**	**52,526**

		Financial liabilities at amortised cost $'000s	Financial liabilities at fair value through profit or loss $'000s	Total $'000s
Liabilities as per balance sheet				
Employee benefits		9,267	–	9,267
Trade payables and accrued expenses	**10**	13,090	–	13,090
Lease liabilities	**7**	3,659	–	3,659
Total		**26,016**	**–**	**26,016**

20. Financial risk management

ESR's activities are exposed to a variety of financial risks, market risks (including cash flow and fair value interest rate risk), credit risk and liquidity risk. ESR's overall risk management programme focuses on the unpredictability of financial markets and seeks to minimise potential adverse effects on ESR's financial performance. The policies approved and financial instruments being utilised at balance date are outlined below:

a. Market risk

In accordance with its Treasury Management Policy, ESR uses derivative financial instruments to economically hedge its exposure to foreign exchange risks from its operational, financing and investment activities. These derivatives are classified at fair value through profit or loss, and gains and losses are recognised as profit or loss in the statement of profit or loss and other comprehensive income.

i. Foreign exchange risk

Foreign exchange risk occurs as a result of transactions denominated in a currency other than ESR's functional currency of New Zealand dollars. Currencies commonly transacted in, and giving rise to, foreign exchange risk include the United States dollar, Australian dollar, Euro and the Pound sterling. ESR is subject to foreign currency risk through its trade receivables and trade payables balances.

ESR is required by its Treasury Management Policy to hedge net foreign currency exposures equivalent to greater than NZD $100,000 using approved treasury instruments.

At 30 June 2024 ESR held six (30 June 2023: six) forward exchange contracts with notional principal amounts totalling $5,855,000 (US$3,600,000) (30 June 2023: $5,371,000 (US$3,250,000)). The gains or losses on the forward exchange contracts is recognised in the statement of profit or loss and other comprehensive income.

The carrying amounts of the Group's trade and other receivables denominated in foreign currencies are:

Group	2024 $'000s	2023 $'000s
US dollar	2,610	1,993
Australian dollar	48	267
Euro	21	20
Pound sterling	27	1
Singapore dollar	–	20

The carrying amounts of the Group's trade and other payables denominated in foreign currencies are:

Group	2024 $'000s	2023 $'000s
US dollar	666	431
Australian dollar	78	118
Euros	18	–
Pound sterling	13	19

ii. Interest rate risk

As at reporting date, ESR is subject to interest rate risk through the holding of cash and cash equivalents and investment cash. ESR uses a mixture of call and investment accounts to hold excess funds. Available interest rates are monitored to ensure the best return.

iii. Market risk sensitivity analysis

ESR is exposed to market risk through the holding of the following financial instruments: cash, trade receivables and trade payables. ESR has analysed the sensitivities in market risk factors over a 12-month period below:

- proportional foreign exchange rate movement of -10 per cent (depreciation of New Zealand dollar) and +10 per cent (appreciation of New Zealand dollar) against foreign currencies
- a parallel shift of +2 per cent/-2 per cent in market interest rates in New Zealand.

If these movements were to occur (all other variables held constant), the impact on ESR's reported net profit after tax for the year ended 30 June 2024 would be:

- foreign currency $372,000 (30 June 2023: $317,000)
- interest rates $506,000 (30 June 2023: $501,000).

b. *Credit risk*

Credit risk refers to the risk that a counterparty will default on its contractual obligations, resulting in financial loss to ESR. The financial instruments which expose ESR to credit risk are, principally, cash and cash equivalents, investment cash, trade receivables and contract assets.

Bank balances and short-term investments (comprising cash and cash equivalents and investment cash) are held with New Zealand registered banks in accordance with ESR's Treasury Management Policy.

The majority of high-value trade receivables and contract assets comprise government entities and therefore the potential risk of default is low. ESR has a Contract Management Policy which requires assessment of the credit worthiness of potential clients, where the value of the contract is material as defined in the policy.

A provision for doubtful debts is maintained in respect of trade receivables and this is reassessed on a regular basis. No collateral is held by ESR in respect of cash and cash equivalents, investment cash and trade receivables as at 30 June 2024 (30 June 2023: nil).

The carrying amount of financial assets recognised in the statement of financial position best represents ESR's maximum exposure to credit risk at the reporting date.

As at 30 June 2024, the trade receivables balance included $5,483,371 (30 June 2023: $3,695,982) owed by entities within, or owned by, the New Zealand Government. It is not believed that there is any material risk of loss with these receivables.

c. *Liquidity risk*

Prudent liquidity risk management implies the availability of funding through adequate levels of committed credit facilities. Liquidity risk is monitored through the forecasting of cash flows and ensuring that the committed credit lines in place remain adequate for requirements.

The contractual undiscounted maturity analysis of financial liabilities is presented below:

Group 2024	Total contractual cash flows $'000s	Less than 1 year $'000s	1–2 years $'000s	2–5 years $'000s	Greater than 5 years $'000s
Trade payables	13,403	13,403	–	–	–
Employee benefits	8,426	6,263	153	114	1,896
Lease liabilities	4,719	518	490	1,152	2,559
Derivative financial instruments	50	50	–	–	–
	26,598	**20,234**	**643**	**1,266**	**4,455**

Group 2023	Total contractual cash flows $'000s	Less than 1 year $'000s	1–2 years $'000s	2–5 years $'000s	Greater than 5 years $'000s
Trade payables	13,090	13,090	–	–	–
Employee benefits	9,267	7,305	49	92	1,821
Lease liabilities	5,253	535	518	1,398	2,802
	27,610	**20,930**	**567**	**1,490**	**4,623**

d. Fair values

The carrying value of financial assets and liabilities recorded in the financial statements approximate their fair values.

Fair value is generally based on the contracted amount payable/receivable of financial assets and financial liabilities, being the amount for which the financial instrument is to be exchanged. Fair value includes the impact of any assessed impairment of the financial instruments – refer to the statement of material accounting policies for details of each financial instrument and their recognition criteria.

e. Capital risk management

ESR objectives when managing capital are to maintain financial stability, achieve sustainable growth, and realise its strategic goals and targets, all within the risk appetite of its shareholders, board and management.

In line with Government requirements, ESR monitors its capital structure through the return on equity and gearing ratios. Government provides ESR with guidelines with the expectation that an appropriate average return is achieved over time, rather than requiring that ESR meet the specified targets annually.

Each year ESR internally sets return on equity and gearing ratio targets, bearing in mind the overall results expected by Government. The ratios are reported in the Statement of Corporate Intent.

The return on equity and gearing ratios as at 30 June 2024 and 30 June 2023 were as follows, along with the relevant annual targets set by ESR.

Group **Return on equity ratio**	**2024** **$'000s**	**2023** **$'000s**
Profit for the year	**2,327**	**84**
Average equity	66,870	60,664
Actual ratio	**3.48%**	**0.16%**
Target ratio	**2.3%**	**3.5%**
Gearing ratio		
Net debt		
• Lease liabilities – current	398	400
• Lease liabilities – non-current	2,863	3,259
	3,261	3,659
Equity	**73,033**	**60,706**
Actual ratio	**4.3%**	**5.7%**
Target ratio	**4.4%**	**5.0%**

21. Contingent liabilities

There are no contingent liabilities as at 30 June 2024 (30 June 2023: nil).

22. Subsequent events

ESR commenced a review process with staff on 18 July 2024. As no decisions have been made, the impact to ESR is not yet known.

There were no other events subsequent at reporting date that require disclosure in the financial statements (30 June 2023: nil).

Part D: Appendix
Āpitihanga

Forensic analysis of blood pattern. Source: ESR.

Governance Mana whakahaere

Report of the Directors

The directors present the Annual Report and audited financial statements of the Institute of Environmental Science and Research Limited for the year ended 30 June 2024.

The Auditor-General is the statutory auditor pursuant to section 21 of the Crown Research Institutes Act 1992. The Auditor-General has appointed Sarah Turner, using the staff and resources of PricewaterhouseCoopers, to audit the financial statements and to express an opinion on them.

Principal activity

ESR is a Crown Research Institute that provides specialist scientific services and research, particularly to the health and justice sectors. Its purpose is to deliver enhanced scientific and research services to the public health, food safety, security and justice systems, and the environmental sector to improve the safety and contribute to the economic, environmental and social wellbeing of people and communities in New Zealand.

Dividends

No dividends have been declared or paid in respect of the 2024 financial year.

Directors' indemnity

ESR has arranged for directors' and officers' insurance for any act or omission in their capacity as a director of the company.

Directors' use of information

No member of the Board of ESR, or any subsidiary, issued a notice requesting to use information received in their capacity as directors that would not otherwise have been available to them.

Donations

The ESR group made koha and donations of $3,851 during the 2024 financial year.

Access to independent professional advice

It may be necessary, from time to time, for directors to seek independent professional advice, either individually or collectively, to help them fulfil their duties and obligations. This advice, with the approval of the Board Chair, is at ESR's expense.

Directors' development

Directors are encouraged to pursue development opportunities to support their practice and ensure ESR maintains strong governance arrangements. The Board had a budget of $30,000 to cover directors' development.

Board activity in 2023–2024

During 2023–2024, a total of 26 Board and committee meetings were held. Meetings were a mix of in-person across ESR's sites and video conference, and the Board and management worked together to make these effective and impactful.

Directors were actively involved in meetings of the ESR Strategic Science Advisory Panel.

The Board reviewed its Charter and Committee Charters and approved new Charters based on modern good governance practices.

The Board continued with its focus on governance performance and resilience. Building on its learnings from the previous year, the Board undertook a further external 'Board Review and Development' led by Richard Westlake, including a survey, discussion and interviews with all directors, and the Chief Executive. The review identified several ways the Board could continue to enhance and develop its practices.

Governance Committees

Risk and Assurance Committee

Assists the Board in fulfilling its responsibilities for the oversight of the internal control environment, external accountability, the internal audit function, legislative compliance, internal reporting, external audit and oversight of the risk management framework. Members are:

- Kate Thomson (Chair)
- Justine Gilliland
- Professor Sarah Young
- Catherine Abel-Pattinson

People, Culture and Performance Committee

Oversees and recommends to the Board all matters in regard to people, culture, and diversity, including the effective management of the appointment and remuneration of the Chief Executive. Members are:

- Dr Melissa McLeod (Chair)
- Professor Sarah Young
- Dr Bruce Campbell CNZM
- Sir Ashley Bloomfield KNZM

Property Development Committee

Assists the Board in discharging its responsibilities in relation to overseeing ESR's property developments including ESR's new Kenepuru Service Centre.

Members are:

- Kate Thomson (Chair)
- Justine Gilliland
- Dr Matthew Glenn
- Catherine Abel-Pattinson
- Professor Sarah Young

Board and Board committee attendance for the year ending 30 June 2024

The table below includes attendance by Board committee members only and does not include attendance by other Board members who are not members of the committee.

Total number of meetings attended

The Board had 13 meetings[11] in the year ended 30 June 2024. There was a programme of site visits and presentations to the Board by the Senior Leadership Team, management and science staff, which enabled directors to keep abreast of key aspects of ESR's activities.

Board of Directors	Board meetings (out of 13)	Risk and Assurance Committee (out of 4)	People, Culture and Performance Committee (out of 4)	Property Development Committee (out of 5)
Professor Sarah Young	13/13	3/4	4/4	5/5
Catherine Abel-Pattinson	12/13	4/4		4/5
Sir Ashley Bloomfield KNZM	12/13		4/4	
Dr Bruce Campbell CNZM	13/13		4/4	
Justine Gilliland	11/13	4/4		4/5
Dr Matthew Glenn	11/13			4/5
Dr Melissa McLeod	12/13		4/4	
Kate Thomson	10/13	3/4		4/5

11 Under Section 122(4) of the Companies Act 1993 (Act) and clause 14 of the Company's constitution, it was not necessary for the Board of ESR to hold an annual meeting of shareholders in the period.

Directors' disclosure of interests

Directors complete a declaration of interests at the start of their appointment. At each Board meeting, the directors are asked to check and update (as necessary) the register of interests declared that the Board secretariat maintains. Declaration of interests is a standing item on the agendas for all Board and Board committee meetings. Any changes to Board members' interests are tabled and reviewed at the opening of every Board meeting.

For Board decisions relating to significant matters, any potential conflict issues are discussed with the Office of the Auditor-General, or independent legal advice is sought with the prior approval of the Board Chair at ESR's expense.

Directors' interests

No director held any interest in the shares of ESR. ESR has funding contracts with the Marsden Fund of the Royal Society Te Apārangi and the Ministry of Business, Innovation and Employment, which are negotiated at arm's length with appropriate directors' interests being declared.

Except for these contracts, no material contracts involving directors' interests were entered into during, or subsequent to, the period covered by this report. As of 30 June 2024, the following directors had made the following general disclosures:

Professor Sarah Young (Chair)

- Executive Dean, Faculty of Science, University of Canterbury
- Board Member, Canterbury Medical Research Foundation
- Adjunct Professor, University of Sydney
- Director, ESR Limited

Catherine Abel-Pattinson

- Chief Operations Officer, Netsafe New Zealand
- Director of International Accreditation New Zealand
- Trustee Abel-Pattinson Family Trust
- Shareholder Meridian Energy
- Shareholder in Counties Energy Trust (all shares in the company are held by the trustees on behalf of all local power consumers)
- Director of Whakarongorau Aotearoa New Zealand Telehealth Services
- Member, Global Women

Sir Ashley Bloomfield KNZM

- Professor, School of Population Health, University of Auckland
- Chair, Public Policy Impact Institute, University of Auckland
- New Zealand Co-Chair, WHO Working Group for Amendments to the International Health Regulations (2005)
- Contractor, Ministry of Foreign Affairs and Trade
- Southern Cross Ambassador for Pause Breathe Smile mindfulness programme
- Listed speaker with Celebrity Speakers and B2B Speakers, giving one-off conference/dinner speeches to a range of organisations
- Fellow, New Zealand College of Public Health Medicine
- Honorary Fellow, Australasian College of Health Services Management
- Honorary Fellow, Royal New Zealand College of General Practitioners
- Honorary Fellow, Royal Australasian College of Medical Administrators
- Chartered Member, Institute of Directors in New Zealand
- Trustee, AR and EL Bloomfield Trusts

Dr Bruce Campbell CNZM

- Director, Horticulture New Zealand (Inc)
- Interim Chief Executive Officer, New Zealand Winegrowers Research Centre Limited
- Director, New Zealand Winegrowers Research Centre Limited
- Trustee, Kerikeri Peninsula Conversation Charitable Trust
- Principal, Dr Bruce Campbell Consultants Limited
- Trustee, BD and PM Campbell Trust
- Chartered Member, Institute of Directors in New Zealand (Inc)
- Fellow, New Zealand Institute of Agricultural and Horticultural Science (Inc)
- Member, Royal Society of New Zealand

Justine Gilliland

- Director, Manaaki Whenua Landcare Research
- Director, Tui Ora Ltd
- Director, Union Medical Benefits Society (Unimed)
- Director/Trustee, Agricultural and Marketing Research and Development Trust (AGMARDT)
- Chair, Advisory Board, Begin Distilling Ltd
- Member, Transpower Consumer Advisory Panel
- Director and Member, EDNZ (Economic Development New Zealand)
- Managing Director, In Perspective Ltd (own consultancy – main client – offshore wind)
- Member, Institute of Directors (and Member of Chapter Zero)
- Fellow, Royal Society of the Arts (UK)
- Member, Sustainable Business Network
- Governance Mentor, Mentoring Foundation

Dr Matthew Glenn

- Member, Te Hono Primary Sector Insights Leadership Group
- Member, MBIE Gene Technology Industry Focus Group
- Chief Executive Officer, The Kiwifruit Breeding Centre
- Director and Shareholder, Idea Partners Limited

Dr Melissa McLeod

- Associate Professor, Department of Public Health, University of Otago, Wellington
- Fellow, New Zealand College of Public Health Medicine
- Director, DRTS Concepts Limited
- Appointed member of Pae Whakatere, Health New Zealand – Te Whatu Ora and Te Aka Whai Ora
- Director and Shareholder, McLeod Medical Services Limited
- Trustee, McLeod Family Trust

Kate Thomson

- Shareholder, Dandaloo Farming Company Limited
- Board Member, Endangered Species Foundation New Zealand
- Director, Finance, Risk and Digital Solutions, Upper Hutt City Council
- Director, STRmix Limited

Remuneration of directors

The directors who held office in the period of this report and their total remuneration and other benefits were:

Directors' remuneration	Total
Professor Sarah Young (Chair)	70,158
Catherine Abel-Pattinson	35,079
Sir Ashley Bloomfield KNZM	35,079
Dr Bruce Campbell CNZM	35,079
Justine Gilliland	35,079
Dr Matthew Glenn	35,079
Dr Melissa McLeod (People, Culture and Performance Chair)	35,079
Kate Thomson (Risk and Assurance Chair)	39,079
Total	**319,711**

Strategic Science Advisory Panel

The Board's Strategic Science Advisory Panel is an important part of ensuring our science continues to have a high-quality focus and is open to new international developments and ideas. The panel members up to 30 June 2024 are noted below.

Member profiles

Dr Elizabeth Jazwinska
Independent Board Member and Science Advisor

Dr Elizabeth (Liz) Jazwinska (BSc Hons, PhD, MBA, GAICD) has an extensive background in research and development (R&D) , management and business development, and has held senior positions in academia, industry and government internationally.

Liz is currently an independent board member and science advisor to various boards in both Australia and New Zealand. These include member of the Board of the Westmead Institute of Medical Research (WIMR), member of the WIMR IP and Commercialisation Committee, Chair of the Board of FOXG1 Research Foundation Australia and Chair of the Governance Board of Phenomics Australia (a national collaborative research infrastructure strategy facility). In these roles, she combines her knowledge of genomic sciences with

her expertise in industry to deliver strategic R&D partnerships between academic groups, industry and government, focusing on increasing the impact of research outcomes through translation into commercial products.

Liz has held senior leadership positions at Monash University in Melbourne (Director, Business Development), RMIT University in Melbourne (Director Research, Innovation and Entrepreneurship), Agency for Science, Technology and Research (A*STAR) in Singapore (Director Industry Engagement), the Ministry of Science and Innovation in New Zealand (Deputy Chief Executive Science Strategy and Investment), the Australian Research Council (Executive Director Biological Sciences and Biotechnology) and Johnson & Johnson Research (Executive Director, Strategic Alliances). She founded the molecular diagnostics company SpeeDx in 2009.

Before joining industry, Liz established a substantial academic portfolio in human molecular genetics and authored more than 62 publications in high-ranking peer-reviewed journals. She holds a BSc (Hons) from the University of Aberdeen, Scotland, a PhD from the University of Edinburgh, Scotland, and an MBA from the Australian Graduate School of Management. She is also a graduate of the Australian Institute of Company Directors.

Professor James Curran
Auckland University

Professor James Curran (PhD, MSc Hons, BSc) is Professor of Statistics and Head of Department at the University of Auckland. James's research specialty is in statistical problems in forensic science, and especially problems relating to the statistical interpretation of evidence. James has over 160 publications in this area and others, including two books on forensic statistics. James has been at the University of Auckland since 2005. Before this, he was a member of academic staff at the University of Waikato, from 1999–2005, after a postdoctoral fellowship with Professor Bruce Weir at North Carolina State University (1997–99).

James has considerable involvement in the forensic community. He is currently the President of the Australian and New Zealand Forensic Science Society (2020–) and is a past president of the New Zealand Forensic Science Society (2016–2020). James currently sits on the American Academy of Forensic Sciences DNA Consensus Body and is an affiliate of the US OSAC for Human Biology. James is a Fellow of the Chartered Society of Forensic Sciences (UK), and a Fellow of the American Statistical Association.

James is also a past president of the New Zealand Statistical Association (2011–2014), past editor-in-chief of the Australian and New Zealand Journal of Statistics (2016–19) and past co-director of the New Zealand Bioinformatics Institute (2007–2011).

Dr Kepa Morgan
Pou Hautu Mahi Maioro
Professionals Ltd

Dr Morgan who is of Ngāti Pikiao, Te Arawa, Ngāti Kahungunu, Kāi Tahu and Kāti Māmoe descent, is an innovator, academic, professional engineer and former iwi chief executive. Kēpa's expertise and research is focused on enhancing research outcomes and impacts through solutions that are developed using multiple knowledge systems and frameworks. His company produces evaluations that draw on both mātauranga and science to create solutions that benefit everyone.

Kēpa developed the Mauri Model Decision-Making Framework to provide a holistic process for decision support in contexts of complexity. Kēpa was made a Fellow of the Institution of Professional Engineers in 2010, a Distinguished Fellow of Te Ao Rangahau/ Engineering New Zealand in 2023 and received the Furkert Supreme Technical Award for sustainability and clean technologies in 2016. This coincided with being awarded the Ngā Pae o Te Māramatanga Fulbright Senior Scholar, which Kēpa completed at the University of Hawai'i, Colorado School of Mines, and the University of Arizona, Tucson.

Kēpa's unique approach to problem solving has been applied to national and international challenges, including the Rena disaster recovery, Merauke Integrated Food and Energy Estate (Papua) and Toquaht Nation Development (Vancouver Island, BC). He is now providing direction for delivering Te Mana O Te Wai outcomes, mauri-based evaluation, freshwater

monitoring in lakes and rivers, geothermal development, land-use decision support, infrastructure policy, and marine ecosystem modelling.

Kēpa holds a BE (Civil) and PhD (Civil Engineering) from the University of Auckland, PGDipMgmt and MBA (Technology) from Deakin University, Victoria, Australia, and has extensive governance experience across state, engineering, research and indigenous institutions including several ministerial appointments. Kēpa has been a board member of the International Association for Hydraulic Research (2013–17), the International Association for Impact Assessment (Indigenous Peoples Section Chair 2010–19), was elected life member of South Pacific Professional Engineers for Excellence in 2013 and is currently an elected member for the Te Tatau o Te Arawa partnership with Rotorua Lakes Council.

Remuneration

Disclosure of executive employees' remuneration (included in governance section of annual report since 2020)

Chief Executive remuneration summary 2020–2024

The remuneration of our Chief Executive is reviewed annually by the Board and is determined by a range of factors including advice from external remuneration specialists, including job sizing and market relativity exercises. These are also undertaken on a regular basis and drawn on to inform the determination of salary package.

	Financial year	Salary	Benefits*	Total
Peter Lennox	2024	$602,678	$20,366	$623,044
	2023	$570,187	$17,571	$587,758
	2022	$504,858	$15,594	$520,452
	2021	$454,372	$14,048	$468,420
Keith McLea	2021	$134,961	$19	$134,980
	2020	$508,210	$533	$508,743

**Benefits comprise insurance cover and employer KiwiSaver contributions.*

Senior leadership remuneration 2020–2024

The total combined remuneration of our senior leadership (excluding the Chief Executive's remuneration) from 2020–2024 was:

Financial year	Salary	Benefits*	Total
2024	$2,694,453	$91,053	$2,785,506
2023	$2,368,883	$72,997	$2,441,880
2022	$2,223,603	$68,629	$2,292,232
2021	$2,104,372	$57,595	$2,161,967
2020	$1,463,900	$42,189	$1,506,089

**Benefits comprise insurance and employer KiwiSaver contributions.*

Employee remuneration

As at 30 June 2024, the following total remuneration above $100,000 was paid to 330 employees:

Remuneration range	No. of staff
$100,000 – $109,999	59
$110,000 – $119,999	51
$120,000 – $129,999	37
$130,000 – $139,999	39
$140,000 – $149,999	34
$150,000 – $159,999	18
$160,000 – $169,999	16
$170,000 – $179,999	18
$180,000 – $189,999	14
$190,000 – $199,999	13
$200,000 – $209,999	9
$210,000 – $219,999	7
$230,000 – $239,999	3
$240,000 – $249,999	1
$250,000 – $259,999	2
$290,000 – $299,999	3
$300,000 – $309,999	1
$320,000 – $329,999	1
$330,000 – $339,999	1
$340,000 – $349,999	2
$620,000 – $629,999	1
Total	**330**

Testing at Christchurch wastewater treatment plant. Source: Olga Pantos.

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

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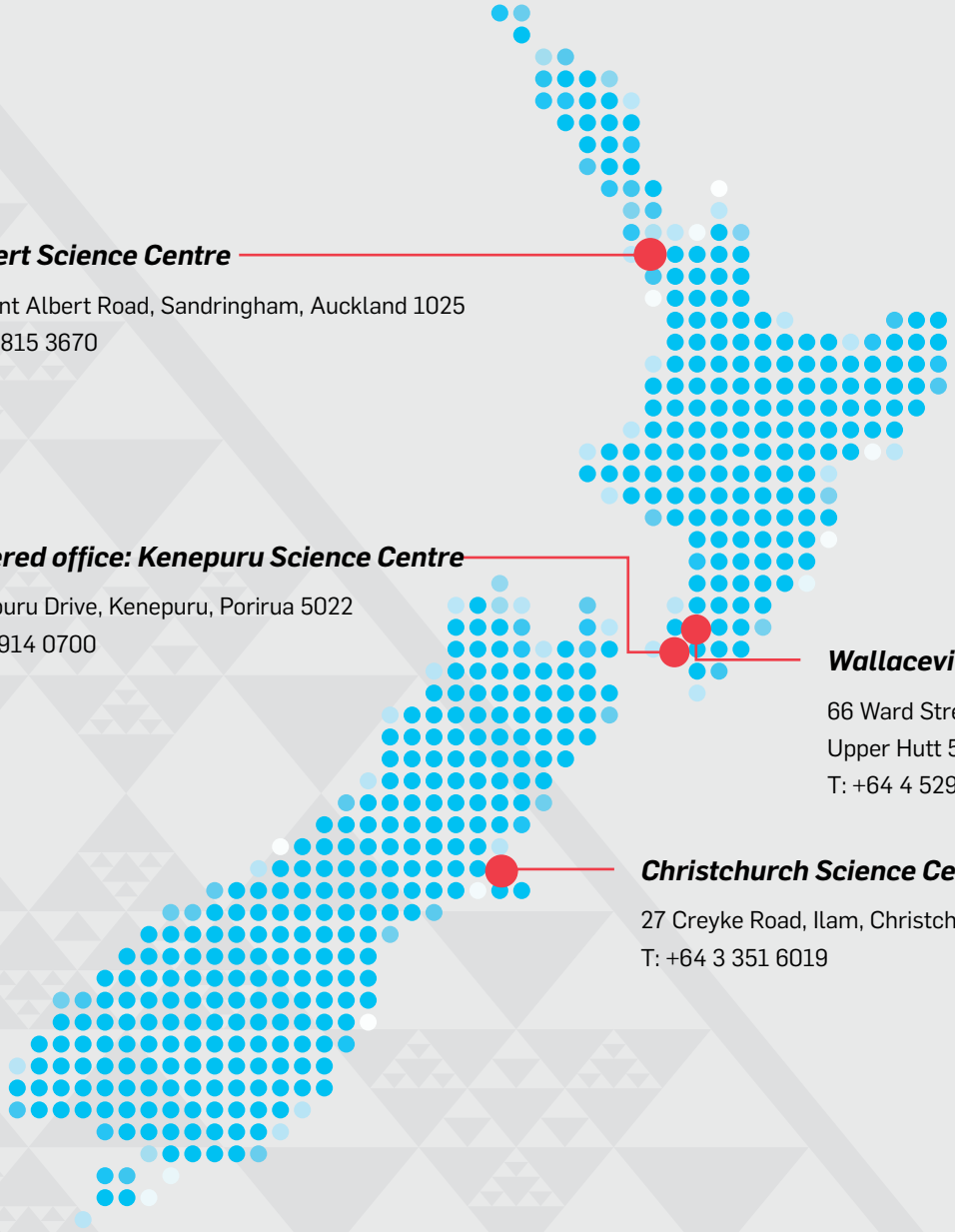
ESR's science centres are located in Auckland, Wallaceville and Kenepuru (Wellington region) and Christchurch.



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