Te Pūrongo a-Tāu

# Annual Report 2022–2023

Science for Communities
He Pūtaiao, He Tāngata

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

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

**Tautohua**
DETECT

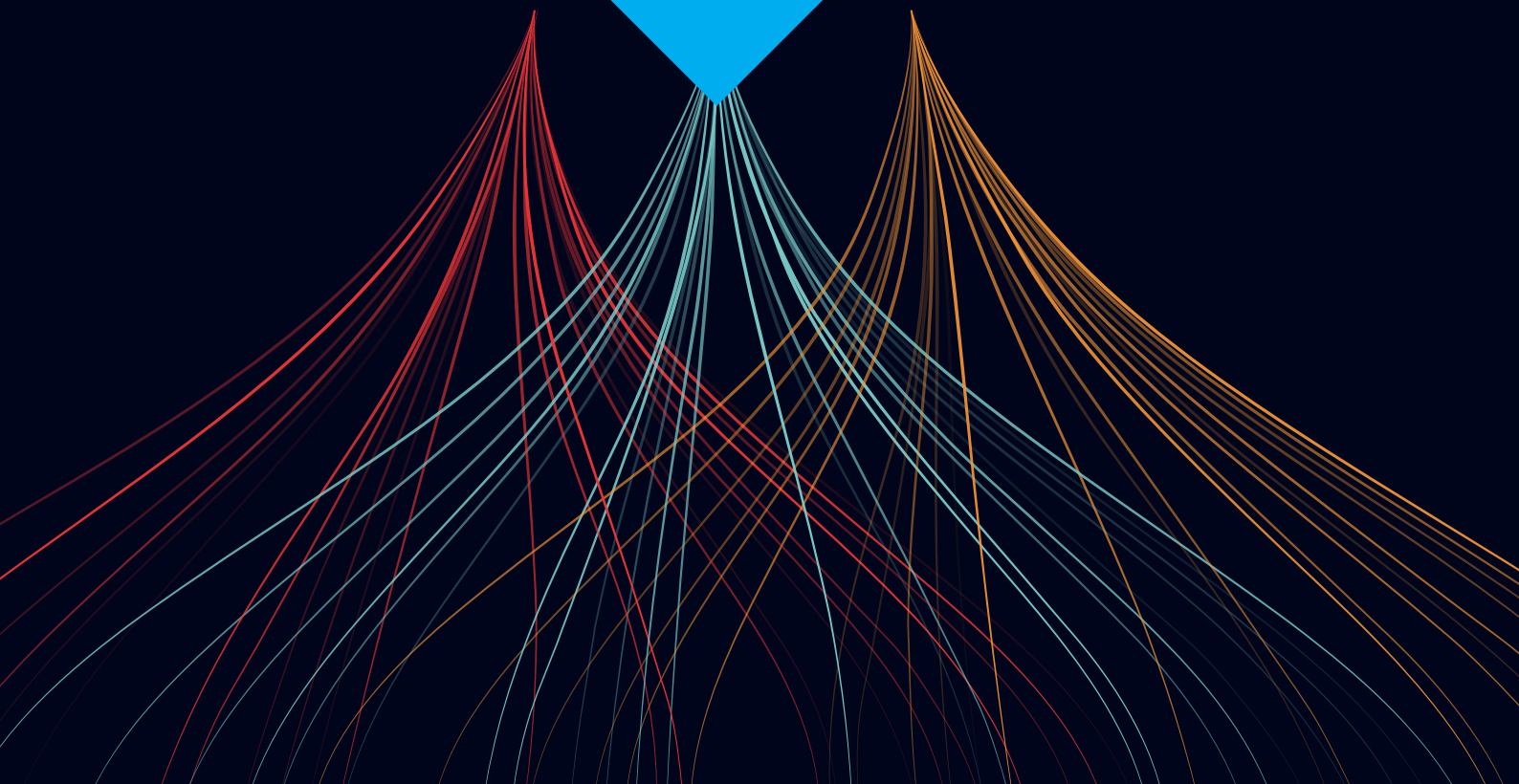
**IDENTIFY** emerging issues by recognising the interconnection between people, animals, plants and their shared environment

**Tiakina**
PROTECT

**KEEPING** communities healthy and safe by delivering comprehensive and connected wellbeing outcomes

**Tūhonotia**
CONNECT

**PARTNERSHIPS** that facilitate a whole system approach to wellbeing



# Ngā Ihirangi
# Contents



Photo credit cover: Bronwyn Humphries

Te Tirohanga a te Heamana
me te Tumu Whakarae

# Chair and Chief Executive's overview

**The expertise and collaborative science leadership demonstrated by the Institute of Environmental Science and Research (ESR) continues to contribute to the improvement of community health and wellbeing in Aotearoa New Zealand.**

We are pleased to present ESR's 2022–2023 Annual Report. It outlines the impact ESR has on improving outcomes for communities and the environment, and records our results for the year against the objectives set out in our Statement of Corporate Intent 2022–2027.

Our people are at the heart of our organisation, and over 2022/23 our dedicated team have helped to make transformative science possible. Several of our staff have been recognised this year with national or international awards. We are proud of the dedication, spirit and professionalism of all our people to deliver outstanding contributions and to support our communities with the challenges they face.

We continue to focus on ensuring ESR is a strong people-centred workplace, which delivers to changing individual and organisational circumstances and needs. This is underpinned by enhancing diversity, equity and inclusion, continuous improvement to health, safety and wellbeing, and designing and delivering initiatives to support improved engagement, empowerment and accountability. We have also refined and shaped ESR's cultural capability and competency to ensure we are a safe and responsive organisation.

## Collaborative science solutions making a difference

ESR's applied expertise lies in our core mission of detecting, connecting, and protecting – and delivering innovative science and developing solutions that benefit communities. We work with a broad range of national and international collaborators such as iwi, science organisations, universities, health providers and government agencies.

ESR science played a critical role in helping New Zealand successfully respond to the global COVID-19 pandemic. We pivoted quickly to provide innovative solutions to detecting the virus in the community and helped ensure better outcomes for our communities. We have continued to build on and apply the skills learnt in surveillance and detection to enable future resilience to infectious disease.

ESR is particularly proud of the work undertaken with our co-host, the University of Otago, and key Māori partners, to grow and embed Te Niwha, an integrated, holistic approach to reduce inequities in infectious diseases and health responses. With a commitment to the principles of Vision Mātauranga and Te Ara Paerangi, Te Niwha provides a comprehensive approach to infectious disease research and response in Aotearoa New Zealand, focusing on partnership and collaboration with Māori and our most vulnerable communities. We are indebted to our Te Niwha co-directors for leadership on this journey to create a new operating model, which sets the basis to transform how infectious disease research is funded and delivered to ensure impact for those communities most affected by infectious disease.

ESR is a keen champion of increased CRI collaboration through pan-CRI initiatives such as improving Māori data sovereignty practices and developing a Pacific environmental exposure assessment to investigate and assess potential climate change risks. We continue to work with other CRI's and core agencies to apply the New Zealand Data and Information Management Principles and create consistency and availability of datasets. These science and business practice workstreams are essential to achieving increased value and impact across the research, science and innovation (RSI) system.

ESR continues to explore how we can better partner with the health sector to increase investment in critical public health surveillance infrastructure and systems, which will enable greater resilience and support. We have expanded our wastewater epidemiology programme to further build on the insights gained about overall community health.

We continue to push the boundaries in science excellence, including building on the commercial successes of ESR's ground-breaking and award-winning products Lumi™ and STRmix™. Lumi is now being used as a frontline policing tool by the New Zealand Police for drug detection. Lumi's success in being awarded the Excellence in Forensic Science Award at the World Police Summit in 2023, is testament to the innovation of ESR's scientists working in collaboration with the New Zealand Police.

Additionally, we have made significant progress in using genomics as an enabler across ESR's impact areas to address equity issues in the justice and health sectors. We have also extended our science capabilities in health-related climate change research by taking a 'disaster microbiology' approach, with an increased focus on environmental effects and climate-sensitive infectious diseases.

## Science sector reforms

ESR continues to work constructively with all science research organisations to enable the vision for Aotearoa New Zealand's research, science and innovation system as outlined in Te Ara Paerangi (Future Pathways).

We continue to actively explore opportunities for greater collaboration across the research, science and innovation system as part of the Wellington Science City initiative. ESR is also working to realise re-investment in our Kenepuru Science Centre as a critical component supporting the Wellington Science City initiative, to ensure ESR continues to deliver world class science for communities.

## Partnership with Māori for Māori

Through our Māori Impact team, ESR is working to build enduring partnerships with iwi and hapū to ensure that our scientific endeavours realise material and holistic benefits for those communities. Through our He Wai Māpuna programme we are focused on providing relevant wai science and technology solutions and capability directly into communities, using a dual knowledge approach of mātauranga Māori and modern science. He Wai Māpuna has several projects of work co-developed with our iwi and hapū partners across Aotearoa. Te Hāpai Ō is a food safety project offering modern science delivery focused on mahinga kai and food safety within customary protection areas. Te Hāpai Ō supports the priorities of iwi and hapū and ensures that this important customary practice is maintained in a safe and sustainable way. The growing strength of our partnership approach with Māori for Māori was further demonstrated when iwi affected by Cyclone Gabrielle proactively sought advice from ESR on silt contamination and invited ESR to assist in managing the silt impact on marae.

He Ō Uta, He Ō Tai is focused on increasing the number of Māori secondary students in STEMM (STEMM as Science, Technology, Engineering, Maths and Mātauranga Māori) in Aotearoa New Zealand. Through partnering with Pūhoro STEMM Academy, we directly support the development of rangatahi and tauira Māori through exposure to cutting edge, relevant and impactful science. Through this partnership, we aim to empower and inspire the next generation of Māori scientists and innovators, enriching the science system with diverse perspectives and expertise.

To give effect to partnership with and for tangata whenua, we recognise that our leadership, culture and behaviours, and research portfolios, must continue to embed mātauranga Māori and expand Māori-led research pipelines to realise Māori aspirations for hauora, Te Taiao, and kai. We continue to invest in the capability of our Māori Impact team and have worked to transform our organisational tikanga and approach, while also building and enhancing cultural capability and understanding.

## Future ready

ESR's investment in future-focused research programmes and world-leading research staff generates technologies and innovation to find solutions to some of the key challenges to the health and wellbeing of our NZ communities. We continually seek to elevate our performance through strategic partnerships and investment that will shape our future direction and delivery for greater frontline responsiveness to combat environmental effects and climate-sensitive infectious diseases.

We remain focused on ESR being a world-leading, innovative and customer-focused organisation, which delivers creative and collaborative solutions to improve the health, wellbeing and environment in Aotearoa New Zealand. We thank our iwi and mana whenua partners, government, university and commercial partners, and ministers for their ongoing dedication and engagement. These relationships allow ESR to be a resilient organisation which is prepared for the challenges and opportunities that lie ahead.

***Professor Sarah Young***
Board Chair

***Peter Lennox***
Chief Executive Officer

He kōrewhatanga
– te arotake o te tau

# At a glance – the year in review

**We have grown our transformative science research and delivery capabilities to create, develop and generate solutions, which improve the wellbeing of Aotearoa New Zealand's people, communities and economy.**

We continue to be recognised for our leadership to deliver on significant research and science service priorities, such as forensics analysis, infectious diseases, antimicrobial resistance, and growing genomics capability across the justice, health, food and water sectors. We have elevated our in-house capacity and capability and strengthened our connections with iwi to enable effective design and delivery of research by Māori for Māori. We have further lifted our science leadership capabilities, as well as national and international collaborations. Following are a number of highlights of our achievements this year.

**Sequenced the genomes of 5,500 microbial samples.**

**Strengthened our partnership with Pūhoro STEMM Academy and remain the only CRI to be a national programme partner.**

**Lumi™ drug detection device rolled-out to frontline New Zealand Police.**

Winner of Excellence in Forensic Science Award at the World Police Summit.

**106 global organisations use STRmix™.**

Three new products rolled out.

Worked with New Zealand Customs to implement new border drug detection capability, which **increased detection of drug compounds by 15%.**

**67 co-authored publications**

(with New Zealand and International collaborators).

**Delivered 17 Environmental Health reports including:**

**4 risk assessments**

**70 pieces of scientific advice.**

## Te Niwha

**Implemented Te Niwha.**

A new model of working and governance with the University of Otago (as joint co-host) and key Māori partners that takes an integrated, holistic approach to reduce inequities in infectious diseases and health responses.

**Led more than 15 research projects to support the food industry and New Zealand Food Safety.**

Presented at seven Pūhoro wananga across six locations around the motu.

**This equates to over 300 rangatahi Māori at Years 11 and 12 learning about ESR mahi.**

Developed an internship programme to attract young Māori science students to grow and advance Māori science leadership and capability.

**Four scholarships provided to tauira Māori studying genomics, data science, ecology and mātauranga Māori.**

**ESR led project identifying key poultry processing steps to improve food safety estimated to have**

**saved New Zealand $15.4 million.**

**80 Peer-reviewed publications.**

**Other highlights and achievements include:**

- **2023 marks the 11th anniversary** of the ESR-led Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance (SHIVERS) programme.
- **Partnered with Durham University** to develop a New Zealand version of an agent-based data science model to track the spread of disease.
- **Launched the Microbial Risk Assessment (MRA) tool** – an online app that calculates the potential microbial impact of land use on nearby water sources.
- In collaboration with University of Canterbury, **produced soap from larvae fat** grown in waste from primary industry and biosolids.
- **Murray Close elected** as a Fellow to the Academy of the Royal Society Te Apārangi.
- **Kia Toipoto action plan developed** to reduce workplace inequities, and increase participation.
- **Over 1000 news media mentions** on genomics, infectious disease, public health surveillance, wastewater, forensics and influenza.

# Te whakanui i ā mātou kaimahi
# Celebrating our people

**Our people are committed to delivering excellence in their work. Our dedicated scientists are recognised for their outstanding contributions that underpin the value of ESR's work for the benefit of Aotearoa New Zealand.**

ESR has worked hard to assemble science teams that are amongst the world's best led by some of the best science leaders in their respective fields of genomics, bioinformatics, forensics, social, radiation, epidemiology, virology, drug chemistry and toxicology, environmental science and food safety.

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

### *Murray Close was elected as a Fellow to the Academy of the Royal Society Te Apārangi, an honour that acknowledges distinction in research and knowledge at the highest international standards.*

Murray has led pioneering research into groundwater contamination over the last 44 years. He has led multi-agency, multi-disciplinary research teams focusing on the transport and fate of a comprehensive range of contaminants in New Zealand groundwater systems, including pesticides, heavy metals, microbes, and nitrate, and has developed new methods for investigating the vadose zone.

His current research interests include the impacts of land use on groundwater quality, removal of nitrate from shallow groundwater using enhanced denitrification, and understanding groundwater ecosystems. He actively engages with regional and district councils throughout New Zealand who have the responsibility to manage groundwater resources. His research has advanced groundwater management practices for the regional councils by providing them with the necessary knowledge of groundwater systems and processes.

### *Dr Rob Lake was awarded the 2023 Significant Contribution to Food Safety Award.*

Recently retired from ESR, Dr Rob Lake's long career in food safety has seen him awarded the 2023 Significant Contribution to Food Safety Award, sponsored by New Zealand Food Safety, at the New Zealand Institute of Food Science and Technology (NZIFST) Awards in early July. His leadership of countless food safety, foodborne illness, and food hygiene projects have made a real impact to New Zealand's food safety system and understanding of foodborne illness.

As a senior manager at ESR, Rob has for the last eight years managed a large group of scientists involved in not just food safety science, but also water quality, drugs in wastewater analysis, hazardous substances risk assessment, water and sanitation in the Pacific, and social systems science.

In addition Rob has contributed to public health responses, including the Havelock North campylobacteriosis outbreak and ESR's support for the COVID-19 pandemic response.

### *Dr Helen Poulsen: New Zealand Science Individual / Lifetime Achievement Awards for her continuing noteworthy contributions to forensic toxicology.*

Dr Helen Poulsen is a Science Leader/Forensic Toxicologist at ESR 's Forensic Service Centre. Helen harnesses forensic science to make a positive difference to the health, safety and wellbeing of communities in Aotearoa New Zealand.

Helen marked 40 years' service at ESR/DSIR in 2022, during which she has lent her wealth of expertise in drug chemistry to innumerable trials, coronial hearings, and panels, ensuring science-based evidence remains front and centre in Aotearoa New Zealand's judicial processes and public policy. Helen is our Forensic Toxicology Science Leader in the Forensic Specialised Analytical Services team.

### *Dr Maarten Kruijver: New Zealand Science Early Career Researcher Award for his mathematical expertise in the revolutionary STRmix software.*

Dr Maarten Kruijver is a Senior Statistician Developer for STRmix. Six years after completing his PhD, ESR forensic science expert Dr Maarten Kruijver is playing a crucial role in ensuring fair and equitable outcomes prevail in courtrooms worldwide.

Now an internationally recognised expert in forensic genetics, probabilistic genotyping, and forensic statistics, Maarten joined the team behind ESR's revolutionary STRmix forensic software in 2016. STRmix empowers investigators to resolve DNA mixtures once considered too complex to be analysed, and with this brings answers to victims, families, and communities.

Maarten is also the developer of DBLR, another of the growing suite of STRmix software applications which allows forensic laboratories to undertake extensive kinship analysis, carry out rapid database searches, visualize the value of their DNA mixture evidence, and carry out mixture-to-mixture matches.

### *ESR's Drugs in Wastewater Team: New Zealand Science Team Award for their cutting-edge work and wastewater analyses to better understand drug usage trends and reduce drug harm in Aotearoa New Zealand.*

This team of passionate ESR scientists led by Andrew Chappell set about harnessing the power of wastewater to understand drug usage trends in Aotearoa New Zealand. The value of their work means they have strong relationships with the health and justice systems. With its interest in illicit drug use at the community rather than individual level, wastewater drug testing aligns with the focus on wellbeing, approaching drug use as a health issue. The insights yielded by ESR's team empower the health system to see where support and resources are needed and redirect them accordingly. To date, ESR's Drugs in Wastewater Team has applied wastewater testing methods to measure consumption of illicit drugs including methamphetamine, MDMA, cocaine, heroin, and fentanyl.

### *Andy Pearson won the Emerging Scientist Award at the New Zealand Hydrological Society awards in December 2022.*

As a Senior Groundwater Scientist, Andy's research focuses on determining and remediating the impacts of land use (particularly nitrate pollution) and waste disposal on Aotearoa New Zealand's groundwater quality. Andy aims to use research findings to assist resource management decision-making and inform approaches to environmental and public health protection.

### *Dr Laura Banasiak won the People's Choice Best Presentation Award for her oral presentation at the New Zealand Hydrological Society awards in December 2022.*

Dr Laura Banasiak, Senior Scientist in the Water and Environment Group, is part of a collaborative research project with researchers from the University of Canterbury on the recycling of end-of-life tyres in a cost-effective and sustainable eco-rubber geotechnical seismic isolation (ERGSI) foundation system for new low-rise buildings. If realised, this research could divert all the waste tyres generated in New Zealand annually (~2.3 million) to just over 700 new homes.

Laura won the prize for her presentation: Recycling of end-of-life tyres in seismic foundation systems – Assessment of potential leaching.

Te tuku i te kairangi ā-pūtaiao mō Aotearoa

# Delivering science excellence for Aotearoa New Zealand

**ESR is the Crown Research Institute that has a critical national role in public health and forensics and is a significant contributor to environment and biosecurity outcomes. ESR provides scientific leadership and generates policy-ready intelligence and service delivery to support some of New Zealand's most critical decisions. By applying expertise from our rich array of health, forensic, food, water and radiation services, communities will thrive and prosper.**

## Our vision, mission, purpose and impact areas

Our vision is to be at the forefront of attaining the lowest burden of crime, environmental contamination and infectious diseases for Aotearoa New Zealand while honouring Te Tiriti o Waitangi.

### Our mission

We **Detect**, **Connect** and **Protect** allowing communities to thrive and prosper through combining and applying expertise from our rich array of health, forensic, food, water and radiation sciences.

### Our purpose and impact areas

**Our purpose** is to ensure that we protect and enhance the wellbeing of people living in Aotearoa New Zealand through:

- Impact for **Māori**.
- Effective infectious disease identification, prevention and response for **healthier communities**.
- Forensic leadership that prevents, detects and resolves crime and drug harm and provides leadership in radiation safety for **safer communities**.
- Integrated health, water and environmental science to deliver **cleaner water and environment**.
- Preventing and detecting food contamination for **safer food and mahinga kai**.

### The science we deliver in these impact areas

ESR leads research, science delivery and commercial opportunities from integrated, multi-disciplinary science (including recombinant science where applicable) in the following domains:

- Public health and biosecurity.
- Forensic related to safety, security and justice.
- Environmental safety of freshwater and groundwater.
- Environmental food safety risks.
- Radiation safety.

# Te rautaki a ESR i runga whārangi kotahi
# **ESR's strategy on a page**

| | | | | | |
|---|---|---|---|---|---|
| **Vision** | The Institute of Environmental Science and Research (ESR) will be at the forefront of attaining the lowest burden of crime, environmental contamination and infectious diseases for Aotearoa New Zealand while honouring Te Tiriti. | | | | |
| **Establishment** | ESR was created in 1992 when New Zealand's Department of Scientific and Industrial Research (DSIR), founded in 1926 was configured into Crown Research Institutes (CRIs). As a CRI we play a critical national role in public health and forensics and are a key contributor to Aotearoa New Zealand's environment and biosecurity protection. | | | | |
| **Purpose** | ESR protects and enhances the wellbeing of people living in Aotearoa New Zealand. | | | | |
| **Mission** | We **Detect**, **Connect** and **Protect** allowing communities to thrive and prosper through combining and applying expertise from our rich array of health, forensic, food, water and radiation sciences. | | | | |
| **Values** |  | | | | |
| **Output areas/ organisation structure** | ESR generates research, service delivery and commercial opportunities from recombinant science in the 5 following domains:<br>1. Public health and biosecurity<br>2. Forensic related to safety, security and justice | | 3. Environmental safety of freshwater and groundwater<br>4. Environmental food safety risks | | 5. Radiation safety |
| **Objectives** | To 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. | 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. | Strengthening business systems and processes to increase efficiency with regards to security, governance and sustainable activities. |
| **Outcomes** | Increased Māori partnership, participation, leadership and mātauranga Māori in research, delivering greater impact with and for Māori. | A thriving people-centred workplace that embraces Te Tiriti. | 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 innovative applied community focused science. | Increased long-term organisational and system sustainability and resilience through innovation, collaboration and system security. |
| **Strategic pillars** | **Understanding our value**<br>Growing our innovation and influence through understanding and responding to our customers, communities and Iwi needs. | **Building our team**<br>Being an employer of choice with a healthy work environment encouraging growth and wellbeing. | **Shaping our future science**<br>Enabling foresight to foster relevant co-designed trans-formational research and service delivery for communities. | **Increasing our impact**<br>Providing prioritised and integrated research that secures outcomes and impacts positively upon the economy. | **Building stronger foundations**<br>Embedding, upgrading and strengthening our infrastructure, systems and processes. |
| **Strategic foundation** | Actively enabling Te Tiriti, Māori leadership and Mātauranga Māori as an integral part of ESR applied science/delivery for future wellbeing and equity challenges. | | | | |
| **Impact areas** | Māori | Healthier communities | Safer communities | Safer food | Cleaner water and environment |
| **Next 1–3-year acceleration opportunities** | 1. Mātauranga Māori led and partnered research<br>2. Infectious disease monitoring | | 3. Health-related impact of climate change<br>4. Artificial intelligence | | 5. Forensic commercialisation |
| **MBIE outcome performance measures** | • Science publications quality and impact<br>• Total revenue/FTE | | • Technology transfer and commercialisation collaborations<br>• Commercial revenue/FTE | | • Demonstrating ESR's commitment to Māori |

# Our focus

ESR continues to invest in research that focuses on future challenges to Aotearoa New Zealand's wellbeing. To do this we support our world-leading research staff to generate technologies and intelligence to address these challenges and take advantage of emerging opportunities. We constantly look to lift our performance through investment and strategic partnerships to deliver improved outcomes for New Zealanders.

We are actively engaged in the future of New Zealand's science system through Te Ara Paerangi – Future Pathways and the proposed Wellington Science City. Through the health reforms and changes we also look to carry on our work with Te Whatu Ora, Te Aka Whai Ora and the Public Health Agency to build and create science outputs that deliver meaningful health and wellbeing impacts for communities.

We continue to build models of engagement and shape our organisational capability and systems to allow for greater participation and partnership with and for Māori while providing ESR's staff with the tools, skills and confidence to engage in ways that acknowledge, respect and recognise the unique position of Māori as tāngata whenua.

Our aim is that the way we work will recognise and respect Te Tiriti o Waitangi. We are aware of the inequities for Māori in the fields in which we apply our science and our ambition is that every aspect of ESR's organisational capability and capacity will facilitate genuine partnership to deliver impact for Māori. We are proactively working with Māori, government, health sector, and justice agencies on how we can best use our expertise to address health inequities, health-related climate challenges and further reduce drug harm and improve justice sector outcomes.

Through our research investment and stakeholder partnerships, we have built on the commercial successes of ESR's ground-breaking and award-winning products Lumi and STRmix. Developing and deepening innovation and commercialisation pipelines is essential for achieving new commercial pathways, supported by robust commercial infrastructure, which enable us to deliver more impactful outcomes for communities nationally and internationally.

To successfully deliver on our strategic objectives and make the meaningful impacts we are seeking, our research and delivery is focused on:

- Integrated research and services in health, environment and forensics that provide iwi and hapū with confidence and support their aspirations for hauora, wai, kai and whenua.
- Genomics approaches for the faster and more accurate surveillance of pathogens to reduce health, food and environmental harms to improve wellbeing outcomes through robust and informed decision-making and prevent and mitigate infectious diseases.
- Genomics, data science and artificial intelligence tools to improve justice outcomes and reduce justice inequities.
- Water systems (groundwater, surface water resources, and wastewater) are sustainably managed and the quality of these is improved.
- Data visualisation tools and insights that support our goal to establish data science models using state-of-the-art algorithms to underpin decision-making, inform policy settings and improve data visualisation and real-time monitoring tools for end-users.

## Growing sustainable partnerships to provide community-focused science solutions

We recognise that in an increasingly connected and technologically advancing world, research participation and partnerships help us adapt and respond to emerging issues and deliver solutions and results to extend innovation. Increased sustainable and enduring partnerships help create improved impact pathways, knowledge sources and data, as well as opportunities for public good and commercialisation that aim to continuously improve wellbeing outcomes.

We continue to build strategic partnerships, such as with the Peter Doherty Institute for Infection and Immunity in Australia, to combat existing and emerging infectious diseases. We have also expanded ESR's wastewater epidemiology programme to further build on the insights gained about overall community health.

As a science research and service delivery organisation, we are constantly exploring how to better partner with the health sector to increase investment in critical public health surveillance infrastructure and systems, which will enable greater resilience and support. We have engaged across the health sector on designing

the operating model for New Zealand's Lead Public Health Laboratory to provide scientific and clinical leadership to the laboratory science system network.

We have also grown our capacity in 'disaster microbiology' to take a holistic approach to response, recovery and resilience efforts that will further improve public health, food safety and environmental outcomes through sustainable and safe land use and restoration.

Several Memorandum of Understanding and collaboration agreements are in place with New Zealand universities, and we are continually working to develop overarching, longer-term agreements for cooperation in areas of mutual interest and future focus. To build on this we are developing a strategy that will broaden ESR's *Extending Research Capacity* programme that will broaden links to other CRIs and universities to increase resource sharing and sustain long-term benefits.

As the challenges that science institutions are required to address become more complex and global in nature, ESR continues to use our sophisticated horizon scanning to detect new challenges before they arrive and invest in new science solutions before they are needed. By growing our collaboration with iwi, the Government, universities and commercial partners we have strived to achieve greater impact for our communities in 2022/23 and look to do more so in coming years.

# Making a difference – Our impact through 2022/23

Through our research in 2022/23, we have continued to push science boundaries by integrating our capabilities to support the early detection of issues and risks and improve our responsiveness. This will help to ensure ESR is at the forefront of attaining the lowest burden of crime, environmental contamination and infectious diseases for Aotearoa New Zealand.

Many of our research projects created and developed improved or novel testing methods or tools, including advancing workflows, developing sampling methods for monitoring and detecting, and expanding analysis, intelligence and decision-making for public health, environmental, water, food, and forensic sciences. ESR has also continued to work with Pacific partner organisations across the region to support improved health and wellbeing outcomes for communities and countries. Our Pacific work spans the range of ESR's portfolio of activities.

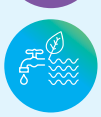
There are five key impact areas where our efforts are focused to deliver, through empowering our people, expanding collaboration through participation, partnership and knowledge, and further lifting research capability and capacity. These are:


**Māori**


**Healthier Communities**


**Safer Communities**


**Safer Food**


**Cleaner Water and Environment**

While most of our work traverses multiple impact areas, some of the key programmes and achievements in 2022/23 under each impact area are outlined below.

Importantly, we have also undertaken a range of cross-cutting activities to further support and advance our science. We developed a range of data science capabilities to augment our traditional sciences, adding more value to our key customers and improving our business. Examples include modelling COVID-19 hospitalisation rates for Te Whatu Ora, image processing to automate the reading of test results, partnering with Durham University to develop a New Zealand version of an agent-based model to track the spread of disease, and developing a large language model to augment internal knowledge management within ESR.

We have strengthened our data science, and artificial intelligence capability and utilisation, to create frameworks which are improving user-centric data technologies and tools to develop digital twins. This enables users to interact with and experiment into the future, in order to gain insights about actions that need to be taken today to achieve the best outcomes. Partnerships have been developed with both the AI Institute at Waikato University and the University of Auckland. These relationships are significant in building capability for the future.

To support sound decision-making in our use of the rapidly developing world of AI, we have become the first Crown Research Institute to become a signatory of the Algorithm Charter of Aotearoa New Zealand, and have developed a Responsible AI Framework to guide our work.

We have also been involved with a Cross-CRI working group for the development of a CRI Māori Data Sovereignty Policy that has led to draft principles being decided, a hui of CRI staff for consultation and feedback and the integration of the principles to the outcomes of the Te Kāhui Raraunga Report on a Māori Data Governance Model.


14m
13
12
11
10
9
8
7
5
4
3
2

## Delivering Impact for Māori

Māori-led partnerships, supported by ESR modern science expertise, are fundamental to delivering impact with and for Māori. Through our Māori impact team we are builidng a for Māori, by Māori, with a kaupapa Māori approach, to how we work.

Each of our partners has a different focus based on their unique environment and whānau aspirations. We work to nurture and develop a mutual understanding of what is important to our partners and what ESR researchers and scientists are able to offer, in order to undertake co-designed research and services that will make a real difference. Impact for the community is our focus, and living the principles of manaakitanga (hospitality and care) and kotahitanga (collaboration) guides our relationships.

Te Hāpai Ō is a food safety project offering modern science delivery focused on mahinga kai and food safety within customary protection areas. The project partners with iwi, hapū and Māori communities to answer the question, is our kai safe to eat? By integrating ESR's modern scientific expertise, and a kaupapa Māori approach, Te Hāpai Ō supports the priorities of iwi and hapū and ensures that this important customary practice is maintained in a safe and sustainable way. By fostering iwi driven outcomes and supporting hapū and whānau, we ensure the safety and wellbeing of both our people and our kai, preserving our harvesting practices for generations to come.

He Ō Uta, He Ō Tai is focused on increasing the number of Māori secondary students in STEMM (STEMM as Science, Technology, Engineering, Maths and Mātauranga Māori) in Aotearoa New Zealand. Through partnering with Pūhoro STEMM Academy, we directly support the development of rangatahi and tauira Māori through exposure to cutting edge, relevant and impactful science. It is the intent of Pūhoro and ESR that this early exposure will increase the number of Māori secondary students progressing through to tertiary institutions and that some of these students will pursue science pathways. Our partnership with Pūhoro has continued to strengthen in 2022/23 with ESR remaining as the only CRI holding nationwide partnership status. Through this partnership, we aim to empower and inspire the next generation of Māori scientists and innovators, enriching the science system with diverse perspectives and expertise. See following showcase.

He Wai Māpuna, is a unique enterprise-wide approach providing wai based science delivery to iwi and investment in iwi to grow distinct iwi knowledge. He Wai Māpuna delivers modern science and supports the development of mātauranga Māori that makes a positive impact on wai. We are focused on providing relevant science and technology solutions and capability directly into communities using a dual knowledge approach of mātauranga Māori and modern science. He Wai Māpuna has several projects of work co-developed with our iwi and hapū partners across Aotearoa that align with creating impact and driving modern science applications in communities. This year we continued our focus to deliver wai based modern science that responds to iwi desired outcomes.

**SHOWCASE**

## *He Ō Uta, He Ō Tai: ESR and Pūhoro STEMM Academy Partnership*

As part of our commitment to promoting Māori representation in STEMM, He Ō Uta, He Ō Tai is proud to support Pūhoro STEMM Academy, a transformative initiative aimed at nurturing Māori talent and increasing their participation in STEMM disciplines and into career pathways.

Launched in 2016, Pūhoro was developed in response to low engagement of Māori in STEMM-related career pathways nationally, that subsequently leads to lower numbers of Māori representation in science and technology industries in Aotearoa. Pūhoro seeks to change this space and recognises that a STEMM workforce is required for an innovation-focused future society. Pūhoro are developing rangatahi to be active participants in the STEMM economy of tomorrow, and are working to develop a community of future Māori technologists, engineers, entrepreneurs, scientists, innovators and thought-pioneers. These leaders will excel in high value careers and be the producers and developers of cutting-edge future innovation as kaumātua envisioned.

This past year ESR continued to strengthen our partnership with Pūhoro STEMM Academy and remain the only CRI to be a national programme partner. The partnership between ESR and Pūhoro highlights the importance of creating a pipeline of Māori in STEMM disciplines. By investing in the education and development of rangatahi and tauira Māori, we can unlock their potential to make significant contributions to Aotearoa New Zealand's innovation landscape and ensure their representation in all areas of the STEMM workforce. He Ō Uta, He Ō Tai focuses on supporting the Pūhoro wānanga delivery, immersive learning experiences held throughout terms one to three each year; mentoring rangatahi and tauira Māori on study pathways to success; and in providing scholarships to four Pūhoro enrolled tauira Māori.

The success of Pūhoro was further highlighted in May 2023 when the Ministry of Education supported the vision of 10,000 Māori students registered in the Pūhoro programme.

PŪHORO

- **Four scholarships provided to tauira Māori** studying genomics, data science, ecology and mātauranga Māori.
- **Delivered science wānanga to over 300 rangatahi Māori** at Years 11 and 12 across the country.
- **Forensics and Bioinformatics and Genomics teams presented at seven wānanga** at six different locations across Aotearoa.
- **Mentored students** studying biology, chemistry and genomics.
- **ESR remain committed** to direct financial investment into Pūhoro.

By providing mentorship, delivering educational sessions at wānanga, and access to valuable resources, Pūhoro empowers Māori students to explore their passion for science and technology. This initiative not only addresses the systemic barriers that have historically limited Māori participation in STEMM but also helps shape a diverse and innovative future workforce. The Government's commitment to Māori education, coupled with ESR's support for Pūhoro, exemplifies a vision of a future where Māori ākonga thrive in STEMM fields. Together, we aspire to create a society where Māori are well-represented, respected, and equipped with the skills and knowledge to shape the future of science, technology, engineering, mathematics, and mātauranga Māori.

In securing this new target ESR, delivered by the He Ō Uta, He Ō Tai programme, is proud to continue our commitment to increasing Māori representation in STEMM.


## Delivering healthier communities

During 2022/23 we have achieved significant milestones in microbial genomics and sequencing with the successful sequencing of approximately 5,500 microbial samples, and offering comprehensive support in sequencing and bioinformatics, ranging from providing sequence data to identifying transmission chains in outbreak investigations. A major accomplishment has been the increased adoption of Next-Generation Sequencing platforms, which have facilitated better understanding of pathogen genetic diversity, outbreak investigations, source tracing, and monitoring antimicrobial resistance.

While vaping is considered as a safer alternative to cigarette smoking, and promoted as a smoking cessation tool in New Zealand, there are growing national and international concerns around the inherent safety of vaping liquids, and emergent health related issues. Over the past three years ESR has funded a research programme to survey and understand the vaping product market in New Zealand. This project enabled ESR to adopt a multi-disciplinary approach to develop new methods for analysing vaping products on the New Zealand market, generating insights into the label claims and safety of these products. The study has highlighted significant concerns around the content of ingredients within vaping products on the New Zealand market, particularly that there was significant inconsistency in alcohol and nicotine content across the product range tested, with limited acknowledgement of the presence of alcohol in a large number of products. ESR's scientists are conducting ongoing testing of products, which will provide important evidence-based data to effect policy and regulatory change.

In February 2023 we introduced poliovirus environmental surveillance, with results that have received acknowledgement from the World Health Organization. Meanwhile in June 2023 we saw the completion of the final time point for the SARS-CoV-2 microneutralisation work for Vaccine Alliance Aotearoa New Zealand (VAANZ) in partnership with the Malaghan Research Institute.

Over the course of 2022/23 we developed an end-to-end workstream for troponin testing in Auckland, which is expected to move into production in 2023. The Troponin iCareFaster workstream integrates high-sensitivity troponin testing at the point of care and produces results in just eight minutes. These will be rapidly distributed to the patients GP and regional repository, leveraging integrations stood up for COVID-19. New Zealand is one of the first in the world to implement this new test and supporting infrastructure.

The 2023 year also marks the 11th anniversary of the ESR-led Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance (SHIVERS) programme. On 1 February 2023, we hosted a highly successful international symposium to celebrate this milestone and showcase the ongoing impact of the SHIVERS research. The SHIVERS programme continues to attract interest from around the globe.

Wastewater based epidemiology continues to provide vital information on the prevalence, trends and variants of COVID-19 in the community through the surveillance of 80 sites, including the reporting of normalised SARS-CoV-2 quantitative data and variant analysis. This wastewater surveillance data is also reported in a public-facing dashboard. In addition to the COVID-19 work, wastewater analysis has been used in the

environmental surveillance of other infectious diseases including poliovirus which commenced in February 2023 in support of the global polio eradication efforts, monkeypox virus for the outbreak response activity in 2022, and methodology for influenza/respiratory syncytial virus (RSV) detection was developed and a pilot initiated.

Following the devastating floods caused by Cyclone Gabrielle, ESR was asked by iwi and local councils in Gisborne to test several sites, where silt was produced by flood waters, for contamination (such as faecal indicators and heavy metals). Data collected from this testing was critical for closing knowledge gaps about silt contamination, risks to public health and whether the silt can be repurposed for agricultural use.

On 30 March 2023, the Ngā Kete Intelligence Hub went live. The hub, within ESR's website, is a central repository of ESR's Health intelligence, and surveillance outputs and dashboards, which enables streamlined public access to health intelligence data.

**SHOWCASE**

### *Partnering for A Prepared Aotearoa: Te Niwha Infectious Diseases Research Platform*

Aotearoa New Zealand's response to the COVID-19 pandemic presented a range of lessons and opportunities for improvement in our research response to future infectious diseases. This included the need for enhanced collaboration between researcher providers, and the people they serve.

To meet this challenge, Te Niwha: The Infectious Diseases Research Platform was born – an initiative hosted in partnership by ESR and the University of Otago, and funded by the Ministry of Business, Innovation and Employment. The $36 million platform is designed to bring together researchers, Iwi Māori, Pacific peoples and the community to harness collective aspirations and leadership to ensure that Aotearoa has world-class research capability to respond to serious infectious disease threats. This new model of working aims to take an integrated, holistic approach to reduce inequities in infectious diseases and health responses.

The Minister of Research, Science and Innovation officially launched Te Niwha at Tūrangawaewae Marae in November 2022, explaining "A strong link between science and action" will mean better expertise and readiness when there are threats. The Minister noted that it is critical to start infectious disease and pandemic preparedness research with the people who will use it in the end, so you are designing it for them.

"It's incredibly important, and it gives us a shared language for being able to assess a situation and be able to take early action."

The platform's research priorities have been structured under two broad areas: improved prevention and control of infectious diseases; and improved management of and response to infectious diseases, ensuring the research spans public health, social and biomedical sciences. These are incorporated across Te Niwha's themes of prevention, surveillance, diagnostics, therapeutics and Te Ao Māori.

Since its launch last year, the platform has already hosted a series of studentships, as well as workshops on topics ranging from infectious disease therapeutics, to essential diagnostic infrastructure, high quality surveillance systems and the role of whānau as champions of prevention and preparedness.

ESR Chief Scientist Dr Brett Cowan says the platform builds on the central role science and communities played in managing New Zealand's response to COVID-19.

"New Zealand can be very proud of its science-led response, which involved harnessing expertise from across the country to inform decision-making and support our communities. In doing so, we could see the benefit in a formal research platform that could bring the right expertise together to position us better for the future. We are proud that a legacy of COVID-19 in New Zealand is a stronger research infrastructure and the launch of Te Niwha is a significant milestone in that journey."

## Delivering safer communities

STRmix forensic software reached another milestone in June 2023 where the STRmix team released the next iteration of FaSTR DNA, with its ability to analyse Promega files for 8-colour multiplexes from the new Spectrum CE System. The 8-colour STR chemistry used on the Spectrum CE System enables forensic laboratories to efficiently obtain more data from each sample, including those that are complex or degraded. Earlier in the year a new version of DBLR was released, allowing users of the Kinship module to be more productive by setting up batch calculations as well as introducing the ability to utilise sequence-based inputs within its Kinship, Search Database, and Explore Deconvolution modules. This followed the release of STRmix version 2.10, which introduced a Visualize Weights module to help analysts investigate DNA interpretation results, and additional improvements to dropout modelling which will allow forensic labs using FaSTR DNA to set a low, or even no, analytical threshold.

ESR has been working together with New Zealand Customs over many years on screening consignments for illicit drugs entering New Zealand through the international mail stream at Auckland Airport. To improve the effectiveness of detection we launched a project in 2022 to research the application of chromatography to rapidly resolve drug mixtures, and address the limitations in our current detection ability. Utilising new chromatography equipment, which we have successfully integrated into the border workflow, our border detection capability has increased by 15%. This has resulted in the identification of drugs that were missed using previous devices, including synthetic cannabinoids, tryptamines, steroids, the components of vaping liquids and counterfeit pharmaceuticals. As well as identifying 'hidden' components, the new capability helps to confirm the authenticity of licit consignments before their release.

Working with the New Zealand Police we have co-developed an operational approach for the New Zealand Police to pilot the use of Forensic (investigative) Genetic Genealogy (FGG) analysis. FGG is the specific analysis of a forensic sample from a crime scene or unidentified human remains where the person or source of the sample is not known.

Our forensic science has supported the further development of the shoeprint comparison application which has resulted in publication of a journal article and interest from Australasian agencies. We also supported model building for the analysis of blood stain patterns with successful student projects being completed for this work.

## SHOWCASE

### *Lighting the way – Lumi marks the end of a bright year*

The last year has seen ESR's Lumi Drug Scan go from strength to strength with the service formally rolled-out to all New Zealand Police districts following a successful six-month trial, before winning a major international award.

Lumi was launched on 8 July 2022, with a large media contingent present to hear about the difference Lumi can make to communities.

Lumi is a new approach exemplifying the innovation and 'out of the box thinking' for which New Zealand is renowned, as it presents a better, safer way of scanning suspected illicit drug samples. The New Zealand Police joined ESR as a co-development partner from the outset, before rolling the service out around New Zealand's Police Districts in 2022/23.

After more than two years of extensive testing and enhancement, it was rewarding for everyone involved with Lumi at ESR to see that the service is rugged and reliable enough to be used 'on the beat' around the country. The growing prominence of Lumi is such that it has entered pop culture, being mentioned on New Zealand/Irish television drama series *The Gone* when an inspector asks a colleague to fetch the Lumi kit after finding a suspected drug sample.

In early 2023 Lumi was shortlisted, and subsequently won, the prestigious Excellence in Forensic Science Award at the World Police Summit in Dubai on 10 March 2023. The win speaks to the value of co-development, and in particular involving at every stage of ideation those who will utilise a product. This concept is woven into Lumi's DNA, as the service was co-developed by frontline police in New Zealand. Receiving this award demonstrates that Lumi is not just world class, it is world-leading, and it is poised to make a positive difference wherever it's rolled-out.

The machine learning model driving Lumi's detection capabilities was significantly boosted in June as another 80,000 scans were added to the cloud-based library against which Lumi compares samples. Taking the total Lumi drug database to 680,000 scans, this has resulted in improved performance.

This year has also demonstrated that it's not just law enforcement benefiting from Lumi. Summer saw Lumi being evaluated at music festivals where it was tested alongside conventional drug checking services. The potential of Lumi to rapidly distinguish between MDMA, methamphetamine and cocaine in festival settings was clear. The information Lumi provided police attending a call-out involving an unconscious person with a point bag in their possession was relayed to A&E clinical staff via first responding paramedics en route, helping ensure the patient got the treatment they needed from the outset. Ultimately, Lumi is focused on providing real-time results that support evidence informed decision making to reduce the harm associated with illicit drug use while encouraging a health-based response.

We will continue working to expand Lumi to offshore markets in 2023/24.

## Delivering safer food

During 2022/23, through the provision of scientific advice and solutions, ESR continued to support the food and beverage industries to ensure they are producing safe food. We led more than 15 research projects to support New Zealand Food Safety (Ministry for Primary Industries (MPI)) and the food industry to understand or manage food safety risks. We also collaborated on additional projects led by research partners. This included: rapid responses to support industry through the COVID-19 pandemic and extreme weather events; gathering intelligence and assessing risk from foodborne pathogens of international importance; developing or applying genomic methods to expose pathogen transmission pathways; applying cutting-edge methods to reveal how pathogens cause disease or can be controlled; identifying and initiating research on emerging food safety risks; and investigating the risks from animal feed and pet foods.

All of this work supports food safety risk assessment and risk management, to ensure New Zealand remains a trusted food producer. A recent economic evaluation undertaken by the New Zealand Food Safety Science and Research Centre used an ESR led project identifying key poultry processing steps to improve food safety as a case study. This project was conservatively evaluated to have saved New Zealand $15.4 million.

ESR produced risk profiles for MPI that assessed how the risk of human salmonellosis from consuming chicken meat and eggs has changed following an outbreak of Salmonella Enteritidis in New Zealand poultry flocks. We also completed a series of 12-month surveys for MPI on selected bacterial isolates from production animals at slaughter which included poultry, pigs, calves, and dairy cattle. Results suggest antimicrobial resistance (AMR) in ***E. coli, Enterococci, Salmonella*** and ***Campylobacter*** from food animals in New Zealand is low and currently AMR in food animals poses a limited public health risk. As part of ongoing AMR surveillance, MPI have contracted ESR, through the New Zealand Food Safety Science Research Centre, to undertake another series of surveys on poultry, pigs and very young calves.

ESR hosted international colleagues at the South Pacific Environmental Radioactivity Association (SPERA) bi-annual conference, held in Ōtautahi, Christchurch, from 28–30 November 2022. With environmental radioactivity and food chain safety a focus of public attention in recent years, SPERA provides a forum for scientists from different disciplines, organisations and countries, including New Zealand, Australia, Austria, Canada, the Czech Republic, Japan, and the United States of America to discuss these complex issues. As part of the SPERA general meeting, ESR's Dr Michael Lechermann was elected as President of SPERA.

## SHOWCASE: FOCUS ON RADIATION

*As New Zealand's expert advisors on radiation safety, ESR's radiation scientists explore issues from testing for radioactivity in foodstuffs for our export markets, and monitoring radioactivity in the environment through to training and testing to support safe and effective use of radiation in medicine and industry. Below is a snapshot of some focus areas in this important field.*

### *Radon monitoring in workplaces*

Radon is a naturally occurring radioactive gas, which is emitted from soils and rock that contain uranium. Radon exposure is the second leading cause of lung cancer, one of the most common and lethal cancers in Aotearoa New Zealand.

A new IAEA Safety standard for radon in workplaces has recently increased the safety factor, sparking a renewed interest in radon in Aotearoa New Zealand. To better understand these risks, ESR's radiation team are undertaking a research project for the Ministry of Health, monitoring radon in workplaces.

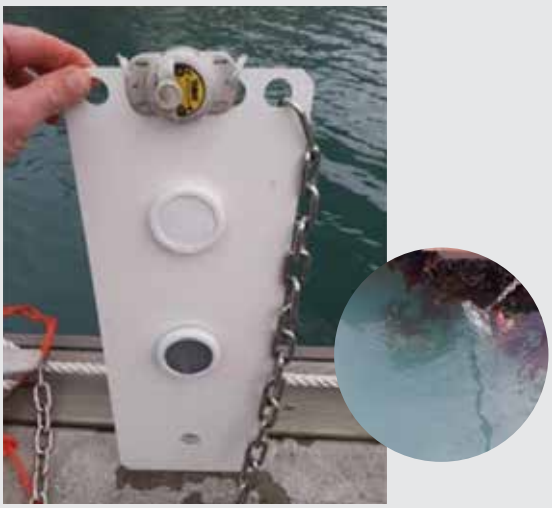
ESR's pilot study took measurements in workplaces that could have elevated radon samples. This study helped to identify locations that are at risk of radon exposure, and workplaces at moderate to high risk were recommended to undertake additional measurements and take steps to reduce radon concentration.

Based on these results, the radiation team recommended that the Ministry of Health implement a radon action plan, as well as national radon reference levels, and that there should be a wider investigation into the radon levels in locations where people live and work around legacy radioactive material.

### *International Atomic Energy Agency*

As an International Contact Point for information about the risk of a nuclear emergency associated with the conflict in Ukraine, ESR receives updates from the International Atomic Energy Agency (IAEA) about the situation and prepares summary reports for the Ministry of Health and Ministry of Foreign Affairs and Trade.

ESR scientists have also been developing and delivering emergency preparedness and response workshops to several Caribbean countries. These workshops focus on preliminary hazard assessments related to nuclear and radiological services. Countries in the Caribbean have similar hazard assessments to Pacific Islands nations, so ESR's experience in this region is greatly valued.



### *Passive samplers' potential to more easily monitor marine radioactivity*

Radioactive contamination of seawater occurs around the world, from accidental and routine releases from nuclear power plants and fuel facilities, and fallout from legacy testing of nuclear weapons. Recently, marine monitoring of radioactivity has received considerable attention in the Pacific region, due to the plans of the Japanese nuclear regulator to allow treated water from the Fukushima Daichi nuclear power plant to be discharged into the Pacific Ocean.

ESR researchers are exploring ways of more easily monitoring radioactivity in seawater. Sealife readily absorbs many radioactive isotopes such as radioactive caesium, due to its biochemical similarity to potassium. This then moves and accumulates through the marine food chain. With a relatively long half-life of 30 years, this makes caesium-137 one of the most significant radioactive contaminants for ecological and human health.

Conventional methods for measuring caesium-137 in seawater are based on selective ion exchange. But because activity concentrations are very low, large sample volumes of 100 litres or more are needed. ESR's project is investigating the use of passive sampling devices, which take their time to gather the quantities of radionuclides they need. They can be placed in marine environments for periods of several weeks or more, over which time they extract and monitor average concentrations of radionuclides.

The results can be processed on the spot, and the same sampler can be redeployed many times over. This passive approach to monitoring and the ability to provide time-weighted average concentrations has the potential to offer a low-cost, yet robust approach to marine monitoring of radioactivity.

**PHOTO TOP** / Field trial to convert 10-ha of irrigated pine plantation into irrigated kānuka ecosystem.

**INSET** / Larvae of black soldier fly ready to be harvested for extraction of high-value products.

## Delivering cleaner water and environment

Circular economy research at ESR has demonstrated the use of insects and New Zealand native species as potential natural systems for recovering resources from biowaste. Research has shown that native trees grow faster when irrigated with treated effluent, increasing carbon sequestration (compared with non irrigated trees) and have the potential to manage some contaminants contained in treated wastewater. ESR is also researching the use of insects to transform low value waste that is usually landfilled into high-value insect products, such as proteins or fat. In collaboration with the University of Canterbury, we have produced soap from larvae fat grown in waste from primary industry and biosolids.

ESR is also leading a project gathering freshwater field data to model potential health risks from swimming. Along with a number of other projects, the goal is to improve New Zealand's freshwater quality and increase engagement with iwi and hapū. Nine councils are involved in collecting 732 samples from 40 water bodies to help create a new model that will support New Zealand's freshwater recreational guidelines. Taking a New Zealand specific approach, the new, up-to-date quantitative microbial risk assessment will use current data to assess the risk of recreational water use and give us a better understanding of the association between pathogens and indicators.

We have undertaken modelling of water and material flows in Christchurch City which demonstrated that greater than 80 % of the nitrogen and carbon, and greater than 60 % of the phosphorus that enter the city as food or biomass, are landfilled or lost as water pollutants and greenhouse gas emissions. Progress is being made on understanding the cultural concerns and aspirations of Māori developing papakāinga for the management of organic waste and wastewater, and the barriers to exercise their manaakitanga and rangatiratanga on decision-making.

ESR has developed a preliminary model for prediction of groundwater health through a combination of biological (DNA, eDNA, taxonomic ID), chemistry, land use and, geological settings using machine learning models. The predictive model will enable assessment of the health of the wai through a holistic view rather than contaminant detection. This enables te mana o te wai to be upheld as the first right of wai is to wai.

We launched the Microbial Risk Assessment (MRA) tool. This online app calculates the potential microbial impact of land use on nearby water sources providing guidance to councils and others on where activity should be positioned to keep drinking water safe. This work is a great example of our science being meaningful and accessible for communities.

ESR has a number of projects working across environment and health security in the region, including work in Tonga, Kiribati and Palau, on water and sanitation sector resilience and safety for communities and the environment. We are also supporting the region with ongoing training in the management of radioactive materials used in healthcare facilities and control of other sources of radiation in the environment. Bridging the gap between environment and health, we have this year been invited to join the World Health Organization and South Pacific Commission-led Pacific Vector Network. We have continued to provide support to many health and health-related committees in the region, including the South Pacific Commission-led Regional Steering Committee for water security, Pacific Islands Public Health Officers Association, and the Pacific Public Health Surveillance Network.

## SHOWCASE

### *Microplastics* – Swimming in plastic

We know plastic is pervasive in our lives, and that a takeaway fork, for example, lasts in our environment long after we have made use of it. It may crumble and break apart, but it persists in ever smaller pieces – in our waterways, soils and oceans. What is the impact of this – on our environment, economy, culture, and wellbeing?

To understand this, ESR scientists are part of a national research programme undertaking the first comprehensive investigation of the impact of microplastics on Aotearoa New Zealand. The Aotearoa Impacts and Mitigation of Microplastics ($AIM^2$) programme includes scientists from six institutions with expertise in areas including marine and freshwater biology and ecology, oceanography, microbiology, molecular biology environmental chemistry, polymer chemistry, ecotoxicology, marine biosecurity, and social science.

Led by ESR's Dr Olga Pantos and Dr Grant Northcott (Northcott Research Consultants Ltd), and funded by MBIE's Endeavour Fund, the research aims to determine the level of risk posed by different plastics. This will be used in combination with the information gained on the distribution and levels of plastics in the coastal and freshwater ecosystems, to determine the potential impact on Aotearoa New Zealand.

The efforts of ESR's microplastics team were profiled in the documentary film *A New Odyssey,* released in June 2023. It followed scientists as they conducted field work in Northland and Fiordland, gathering data about microplastic pollution in some of Aotearoa New Zealand's most pristine waters. During the voyage, the team collected over 100 water samples to analyse for the presence of microplastics, and this analysis is ongoing.

ESR scientists are also involved with policymaking to reduce plastic waste. Olga is part of the Scientists Coalition for an Effective Plastics treaty, a coalition of scientists providing advice to the UN Environmental Programme about plastic pollution and helping back the need for this international treaty. She was also part of the New Zealand delegation at the ASEAN-Indo-Pacific Workshop (Association of Southeast Asian Nations) on Marine Plastic Debris, which brought together Indo-Pacific countries to discuss plastics, and is aligned with the UN treaty. Closer to home, Olga is a science advisor to the Tāngata Whenua Coalition for an Effective Plastics Treaty. The coalition ensures that Aotearoa New Zealand's role in the plastic treaty is responsive to Te Tiriti o Waitangi.

Tā mātou taiao mahi

# Our workplace

## He waka eke noa – Together as One

**Our performance and reputation as a good employer are underpinned by our commitment to fostering a positive, respectful and inclusive workplace culture and work environment that encourages, supports and empowers our people to excel.**

Through our shared values we have continued to build a culturally aware, safe, and resilient environment that supports employees to bring their full self to work, and an organisation that is agile, energetic and recognises the contribution and individuality of all employees. We also encourage our people to challenge old ways of thinking, and this year we continued to build our organisational capabilities to expand our innovation and further embed mātauranga Māori into our mahi.

By investing in and developing our people, we increase ESR's performance and reputation for leadership in science. We employ the principles and practices of equal employment opportunities; have a diverse workplace and inclusive culture; and an environment that enables each person to share their views and develop and perform to the best of their ability.

This year we continued to shape our workforce to ensure we plan for and build capabilities that align with ESR's future needs and those of the wider science system to deliver benefit and impact for Aotearoa New Zealand's people.

Some of our highlights are outlined as follows.

### Growing our people and culture

We have worked to promote a thriving and modern workplace and a culture that is inclusive and grounded in trust, respect and care. We also continue to work toward building a diverse workforce that represents the communities we service across Aotearoa New Zealand.

We have built and piloted programmes to deliver people-centred leadership and create opportunities for staff growth. This is growth that will shape, support and expand ESR's science capabilities to work in partnership with Māori and our local communities to deliver greater impact and provide integrated thought leadership in the health, environment and justice sectors. A diverse and inclusive workforce helps shape the science system for the benefit of everyone.

ESR strives to be an employer of choice for Māori scientists and professionals. Through our investment in and support of the Pūhoro STEMM Academy, we have an internship programme to attract young Māori science students to grow and advance Māori science leadership and capability.

We have continued to refresh our He Pūtaiao, He Tāngata strategy and to identify actions that will create greater space for and impact with Māori. The refreshed strategy aims to build and apply science and business approaches that reflect Te Tiriti o Waitangi through:

- building enduring partnerships with iwi through Māori-led approaches and solutions
- strengthening co-design and co-governance with Māori in all our areas of impact, such as infectious diseases, data sovereignty, the use of DNA, and removing contamination in wai and kai
- creating the pathways for mātauranga Māori expertise and Māori scientists and researchers to flourish, ensuring the research we undertake better delivers for Aotearoa New Zealand.

## Supporting our He Pūtaiao, He Tāngata goals

A core foundational training framework has been established and implemented to provide support for individuals to learn te reo Māori, and understand our commitment to Te Tiriti o Waitangi. This framework has enabled our staff to build their cultural awareness and to connect with our work with He Pūtaiao, He Tāngata.

Over the past year, we have continued to proactively engage in our cultural capability development opportunities. Of our current employees, 49% have completed the level 1 Te Tiriti o Waitangi course and 55% have participated in The Wall Walk. Te reo Māori classes continue to be offered at all sites, both online and in-person, with 41% of our employees having participated in at least one te reo Māori programme.

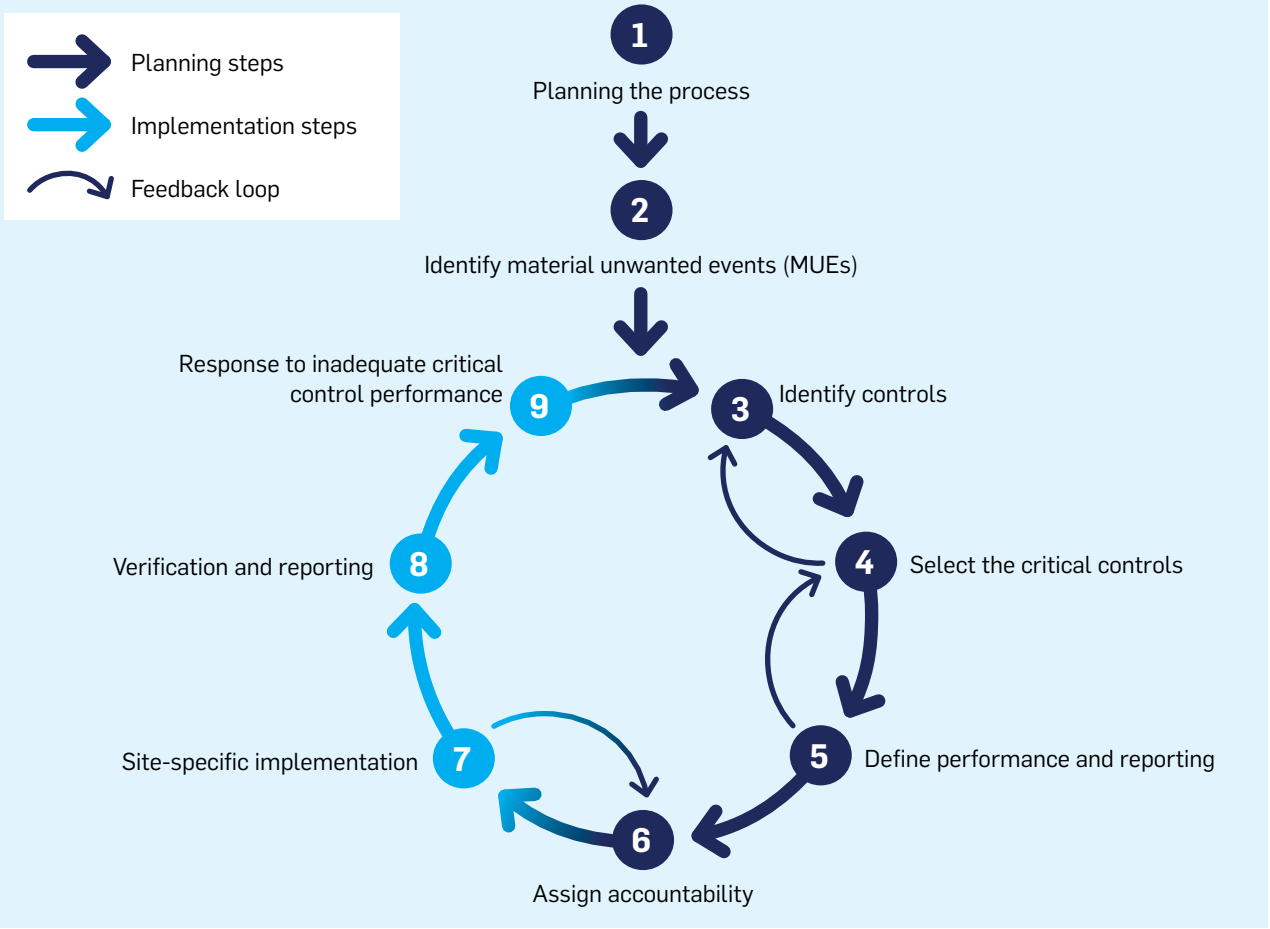
This year we have also piloted a level 2 Te Tiriti o Waitangi programme, designed with our expert facilitators, to provide a framework for the practical application of the insights and learnings from level 1 Te Tiriti o Waitangi. With positive feedback from participants, we are now embarking on a refresh of the framework to build a mix of individual and team learning through both online and face to face settings.

## Action plan to reinforce and shape our positive health, safety, and wellbeing culture

Good leadership and management of our workplace health, safety and wellbeing is essential to support how we manage exposure to risks to keep our people healthy and safe, avoid disruption of business activities and provide effective delivery of our science and research.

In 2021, we embarked on an 18-month-long critical risk management programme discovery journey. This was an integral part of our risk management framework, with a focus on identifying and monitoring the performance of critical controls to prevent realising material risks to staff. This programme encompassed

***Health, Safety and Wellbeing Risk Management Assurance Methodology***



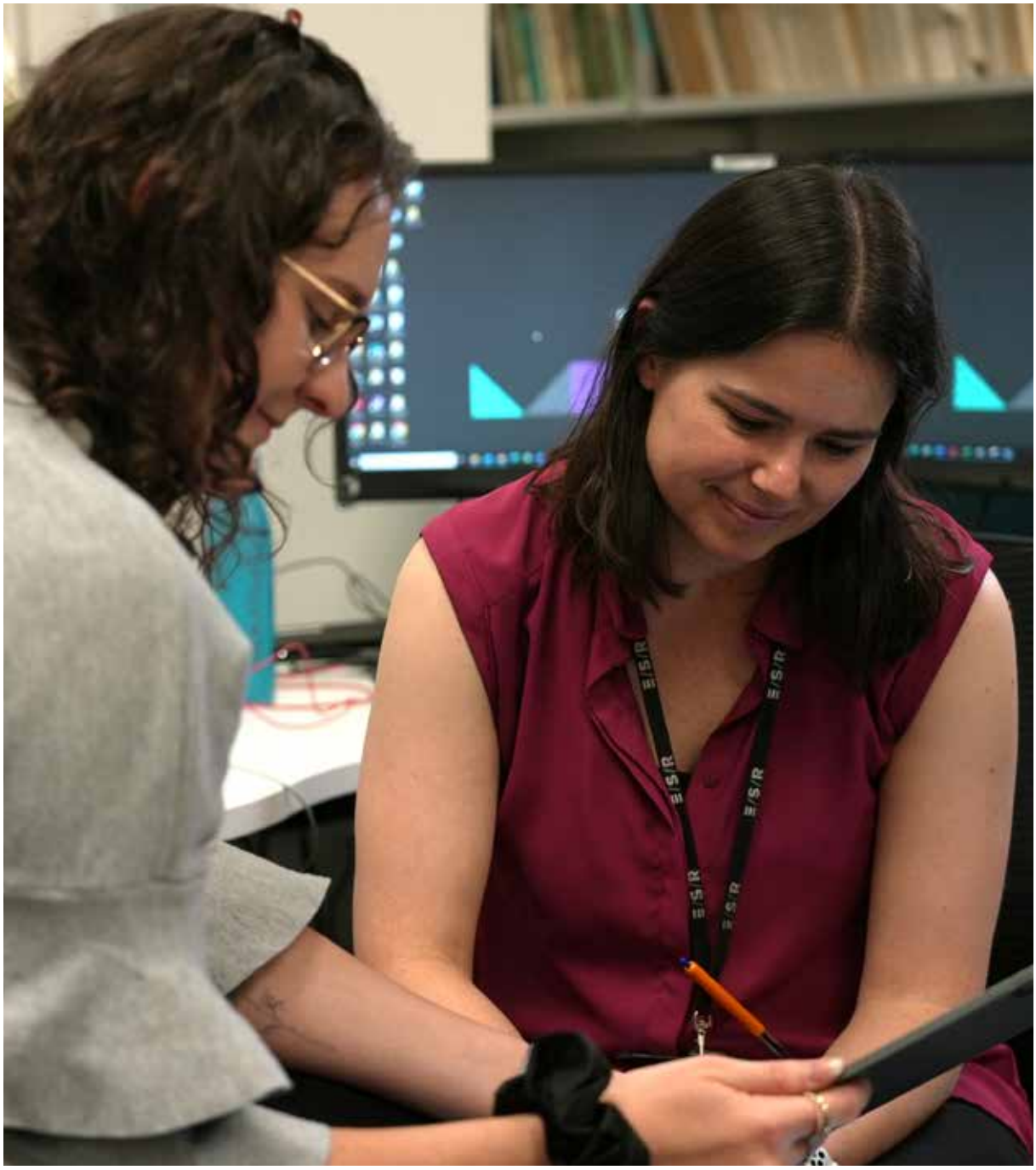
a strong visible leadership component and encouraged active engagement and participation of staff across ESR.

ESR has adopted the Risk Management Assurance Methodology to ensure a continuous improvement approach across health, safety and wellbeing risk lifecycles from planning to control performance.

This enduring process will ensure the future effectiveness and sustainability of managing health, safety and wellbeing risk and associated controls. We have now completed the development of all the risk control plans for ESR's nine critical risks.

The next phase for 2024 will define risk tolerance and priority informing our three-year Health, Safety and Wellbeing Work Plan.

An assurance monitoring framework has also been developed to measure milestone performance informing the detail of monthly and quarterly dashboard reporting.



# Being a good employer

**At ESR, we embrace the principles of being a 'good employer' that the Human Rights Commission recommends. The summary below shows our activities this year against the seven elements of being a 'good employer'.**

| | |
|---|---|
| **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.<br><br>In 2022/23 we launched a Leadership Coaching Pilot, building relationships across our Tier 3 leaders and encouraging their development through a coaching programme centred around the results of the Human Synergistics Life Styles Inventory Assessments I and II. A further pilot will be launched in early FY24 and we will continue to review and assess the improvements gained from this pilot for their sustainability.<br><br>We started work on refreshing ESR's cultural capability programme to ensure our training and learning opportunities support the He Pūtaiao, He Tāngata strategy. We have also developed an ESR People Policy which provides the strategic framework for people and culture related initiatives over the coming three years which will be launched to staff early in FY24. |
| **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.<br><br>Our recruitment and selection processes foster 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. |
| **Employee development, promotion and exit** | Our annual science promotions process supports staff career progression, and all vacancies are advertised internally to provide career development and advancement opportunities.<br><br>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.<br><br>Our online staff learning library 'Ararau' was integrated into Workday, offering 80,000 plus online courses to support staff learning and development goals. Regular analysis helps to determine the types of activity and training staff are accessing, which will inform future development opportunities and the overall capability programme. |

| | |
|---|---|
| **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.<br><br>We encourage our staff to take annual leave in the year it is accrued and support them to manage their hours to maintain wellbeing.<br><br>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. |
| **Remuneration, recognition and conditions** | Our Te Kāpehu and new Remuneration Frameworks aim to support staff to feel valued, recognised and rewarded for their contribution.<br><br>In 2022 ESR launched a review of our compliance against the Holidays Act 2003. From this review, ESR partnered with EY and committed to a Holidays Act Remediation Programme which has reached full resolution with any outstanding payments to be processed early in FY24. The move to our new payroll system ensures that ESR is fully compliant with the current Act. |
| **Harassment and bullying prevention** | We have zero tolerance of bullying and ensure matters are dealt with promptly and appropriately.<br><br>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.<br><br>We updated our protected disclosures policy and guidance ensuring alignment with the Public Service Commissioner's 'Speaking up' model standards. |
| **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 statement, implementation of standard operating procedures, provision of resources and HSW training for all staff.<br><br>We collaborated with our staff and unions to develop an Engagement and Participation Programme that models effective engagement and active participation with all employees and other workers. This model enables our workplace to be safer and healthier through conversations about risks and achievement of solutions, by drawing on the knowledge and experience of everyone, allowing for more informed decisions.<br><br>We continued to collaborate with WorkSafe New Zealand and other CRIs on the requirements for safe work instruments relating to the hazardous substances regulations. This work is essential as ESR continues progressing our Critical Risk Management Programme. |

# Our people by the numbers

**598 employees.**

An increase of 32 over previous year.

**7.70 average days lost due to sickness, accidents, domestic leave.**

An increase of 1.82 days lost over previous year[1].

**Over 78% of ESR staff are engaged in science and research**

which is similar to last year.

**89% of eligible staff are enrolled in KiwiSaver**

An increase of 11 percentage points over previous year.

**17% of our staff work part-time.**

**83 health, safety, and wellbeing event notifications were received**

in 2022/23 which reflects the step change in health and safety awareness and maturity. Of these, 29 related to near misses, 31 injury, and 23 non-injury/illness events. There was an increase in the total number of events reported by 10% from the previous year.

## 49 promotions, career progressions and redeployments

in 2022/23, including 20 internal secondments and one external secondment. ESR actively seeks to support staff development by promoting staff on merit and providing secondment opportunities.

## 7 years is the average length of service of our employees,

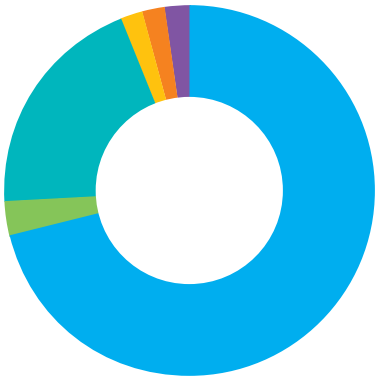
17% have worked with us for less than one year, 17% have worked with us for five to 10 years, while 3% have worked with us for more than 30 years.

## 44 years is the average age, decreasing from 45 years last year.

## 67% of ESR staff are female

which is higher than the 2022 public service average and 2% higher than the previous year.

## Ethnicity[2, 3]



- European – 72%
- Māori – 3%
- Asian – 20%
- Pacific peoples – 2%
- Middle Eastern, Latin American and African (MELAA) – 2%
- Other – 2%

## 10.26% staff turnover.

Our annual rolling average turnover based on headcount is 10.26%, 1.75 percentage points higher than the same time last year. This is lower than the average for public sector organisations, which was 17.3% for 2022.

1 The average number of days lost due to sickness, accidents, domestic leave taken in 2022/23 has increased slightly from previous years. This is mainly due to a change in reporting methodology as we have modified the measurement of this statistic to a rolling average.

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

3 Totals 101% due to rounding.

## Kia Toipoto

Kia Toipoto is the Public Service Gender, Māori, Pacific, and Ethnic Pay Gap Action Plan 2021–24. Kia Toipoto has a focus on improving equity and fairness in public service workplaces, including removing bias and discrimination; fair and equitable pay; recruiting and retaining diverse talent; and cultivating inclusive work environments. ESR is committed to Kia Toipoto and ensuring equity and fairness in the workplace.

ESR has strong female representation, with more than two-thirds of employees being women. More than half of the roles within Executive and Management are also held by women. Science roles at ESR are female dominated, which is reflective of the social science profession both in Aotearoa New Zealand and internationally. Māori and Pacific representation continues to be low, while Asian representation has been increasing in recent years and is now ahead of the New Zealand working age population.

In previous annual reports we have advised that there was no gender pay gap at ESR. This was the outcome of a review of a very small sample across a single position. Over the past year ESR has completed a full pay equity analysis to support the development and publication of the ESR Kia Toipoto Action Plan. From this complete analysis, we can now report the complete findings:

- **Like-for-like pay gaps** at ESR range from 8.5% in favour of women to 6.1% in favour of men. Like-for-like means the difference between the average pay for men and the average pay for women doing the same role.
- The organisational **gender pay gap** is the difference between the average pay for men and the average pay for women in an organisation. At ESR, this difference was 15.6%, as at September 2022. The main driver of this difference is the gender distribution of employees within the organisation, which is known as 'vertical occupational segregation'. This is a common driver of gender pay gaps within organisations, and particularly in public sector organisations with a high proportion of women in operational roles.

Following the introduction of a new Remuneration Framework at ESR, we anticipate that the ESR gender pay gap has reduced and we are currently refreshing the September 2022 analysis.

In 2023/24 we will be engaging with our workforce as part of our Diversity, Equity, Inclusion and Belonging approach to get a better understanding of the factors driving our gender pay gap. This feedback will help us to validate our current Kia Toipoto Action Plan and to support us to develop and implement a plan to reduce the pay gap at ESR in alignment with our Statement of Corporate Intent performance measure.

## Partnership in action

ESR and the Public Service Association (PSA) have a long-standing agreement and commitment to working together to promote shared outcomes. Shared outcomes are underpinned by working in a co-operative and open way, ensuring that there is a culture of mutual trust and respect, and ensuring that shared outcomes improve the working environment at ESR and support skilled, valued, challenged and fulfilled employees.

Working together to promote shared outcomes was very strongly demonstrated during 2022/23 with the agreement of and transition to a new Remuneration Framework at ESR. The agreement was reached in May 2023 and the first step in transition to the new Framework, effective from 1 January 2023, occurred in June 2023. These achievements were the cumulation of effort and commitment over a number of years by the parties and saw ESR, the PSA and PSA Delegates form a joint working group to design a modern remuneration framework that was responsive to the changing employment environment.

ESR and the PSA also came together to deliver improvements to other items that are key to attracting and retaining our talented staff and ensuring that we support staff during their working life. This work has been a great example of partnership in action as we all recognise that our workforce is the heart of ESR and we work together to continue to build a culture of trust, care and respect and an empowering people-centred workplace that is diverse, equitable and inclusive, one that encourages growth and wellbeing, and where individual uniqueness is celebrated and innovation, collaboration and performance thrives.

ESR has also committed to becoming a Living Wage Accredited Employer, an accreditation that supports ESR's sustainability approach.

### Looking ahead

The focus for the past few years has been on improving our business platform with the implementation of Workday, as joint tenant with GNS. With the successful implementation of the Workday Talent and Learn modules, as well as partnering with Datacom to implement a new payroll system in Datapay, the focus for coming years shifts to acceleration areas of leadership, engagement, and optimising the employee experience. This will see the launch of a number of initiatives including engagement, the ESR Diversity, Equity, Inclusion and Belonging framework, as well as refreshing our Wellbeing approach, and focusing on leadership expectations and development.

## Business system resilience and capability

To ensure that as a science organisation we have the systems, processes and decision-making that grow the organisation and ensure that ESR is sustainable and resilient, we have invested in data security and governance to ensure that the infrastructure that supports our science and service is robust and flexible, maintaining the trust and confidence of those who use ESR's data for critical analysis, intelligence and decision-making. This includes implementing Snowflake, a modern data platform that allows us to do more with our data in a safe and governed environment, which includes data warehousing, databases for our research data, and a data lake where scientists can experiment with data.

To further strengthen our project decision-making and management we have implemented a Project Management Office (PMO) to ensure that our investments deliver the maximum impact on time and on budget.

### Workday roll-out to improve resource management, financial control and reporting

With Phase II of the Workday Enterprise Resource Management commenced and largely completed during 2022/23, our focus has now turned to building an optimisation programme which will include enhancing systems and processes, and investigating other features which are not currently in production. ESR and its Workday system partner GNS are also supporting conversations with a number of other CRIs as they review the suitability of Workday as a suitable solution for their needs.

Adaptive Planning for Workday is under way and will be launched in August 2023, providing an integrated budgeting, planning and reporting module within Workday. This will create an interactive platform for the business and Finance around our budgeting and forecasting processes, with real-time visibility of financial information including scenario planning.

### Building infrastructure

Along with other CRIs and universities, ESR provided information, feedback and support for the Government's 'Wellington Science City' initiative as it developed through the 2022/23 period.

Work on ESR's plans for redevelopment of its Kenepuru campus continued through that period as well, providing complementary support for the research functions that would result from the Wellington Science City Project.

ESR made solid progress with the Detailed Design process for the development. A major part of that design development – as has been the case from the genesis of this project – was inclusion of significant cultural elements designed in close partnership with our local iwi, Ngāti Toa Rangatira.

# Our continued commitment to sustainability

Our goal at ESR is that sustainability is part of our DNA, it is embedded in how we conduct our business and team culture. Our Sustainability Strategy and Action Plans, which set out how we will deliver on our commitment to a sustainable future, and highlighting specific targets and actions backed by resourcing and budgets, are nearing completion.

ESR's sustainability policy and strategy aligns us to the United Nations Sustainable Development goals (SDGs). Through our Board, senior leadership team and staff we are committed to making positive, sustainable improvements in how we transact our daily lives and our impact on our community.

## 2022/23 progress includes:

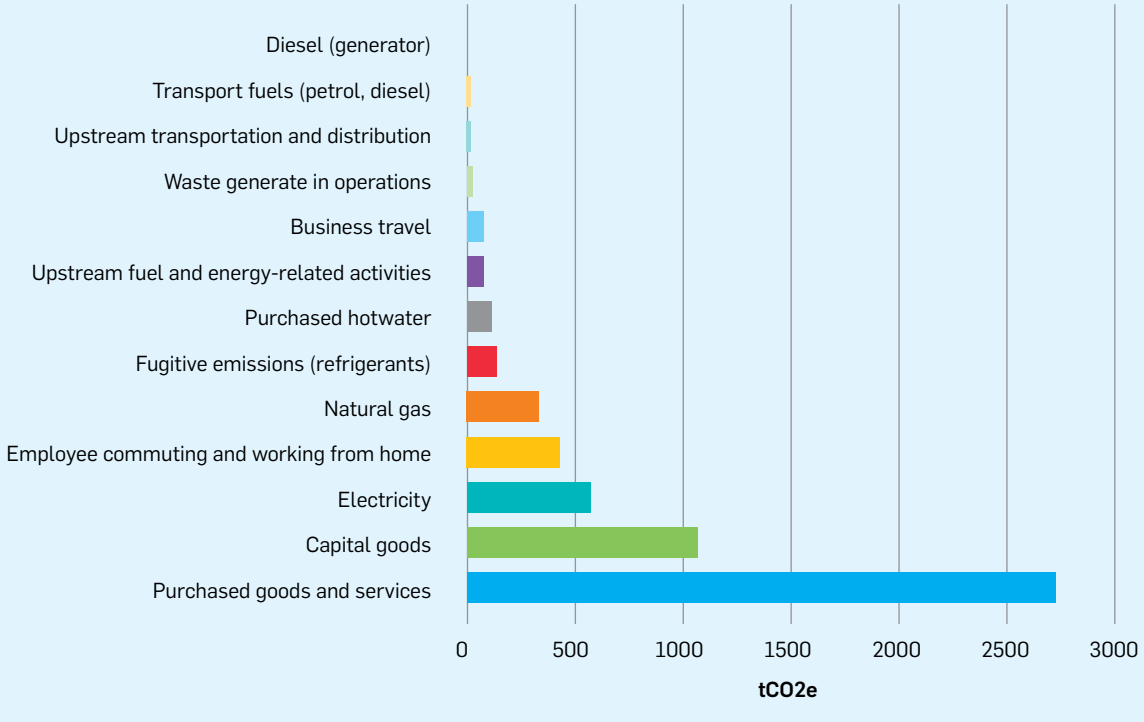
- Completing the Sustainable Business Accelerator and setting up the Sustainability Committee.
- Updating and publishing our Sustainability Policy.
- Developing our Sustainability Strategy.

*Greenhouse Gas Emissions Reduction*

ESR has been reporting our emissions since 2019. The 2022/23 report is our 4th annual Greenhouse Gas Emissions report and we remain committed to measuring, reporting and reducing our Greenhouse Gas Emissions. This year we have had our emissions inventory audited to verify that our approach to measuring emissions aligns with the Greenhouse Gas Protocol and meets best practice.

ESR's overall emissions total for FY22 was 5550 tCO2e (tonnes of carbon dioxide equivalent). This is a 16% increase in emissions when compared to ESR's base year of FY19 (4785 tCO2e). The most significant increase in FY22 was Capital Goods (1059.12 tCO2e), with a 162% increase in emissions when compared to FY21 (404.51 tCO2e). This was predominantly due to our increased capacity, and investment in scientific capabilities, which also contributes to our highest emissions source – Purchased Goods and Services (see accompanying graphic). The most significant decrease in FY22 was in Business Travel (68.33 tCO2e), with a 69.64% decrease when compared to FY21, which was mainly as a result of lower travel due to COVID-19.

***Top emissions sources and their related emissions FY22***



Emissions reduction activities in 2022/23

- Completed the Toitū Carbon reduce programme and audit, with results due later in 2023. This was a significant piece of work that will provide audited measures for ESR's base year (FY19) and be used to set up and track ESR sustainable targets for the future.
- Implemented Mevo, an alternative to car ownership, rental cars and taxis.
- With the help of the Energy Efficiency & Conservation Authority, an ESR site-wide energy audit was started in late June 2023 with the report due in September 2023, which will identify a range of energy efficiency improvements.

Next Steps for 2023/24

- Set an emissions reduction target developed using the science-based methodology.
- Assess the Energy Audit recommendations to determine specific energy reduction and efficiency activities.
- Implement a staff travel reduction plan.
- Develop and implement a sustainable procurement policy to reduce the impact of purchased goods and services.

### *Waste Reduction*

ESR has been prioritising waste reduction for the last 3 years. This year we took the step of completing a waste audit to gain better data and to be able to track our progress year on year. The waste audit found that each site had a very different waste composition.

General Waste (Landfill) is the greatest waste collected from ESR as a group (42%). This shows that we have a significant opportunity to divert further waste from landfill.

Specific waste sources include:

- 9,222kg of medical waste produced each year.
- 796,617 sheets of paper towels are consumed each year.
- Over 979,700 gloves are used per annum.

Waste reduction activities in 2022/23

- In 2023 we completed a waste audit across all our science centres, with recommendations that feed into our new sustainability strategy and the waste reduction action plans that come out of that strategy.
- We started an e-waste programme via the all of Government IT hardware offering.
- Trialling a software called Mutu, that is about repurposing products and items and diverting them from landfill, and repurposing assets that would otherwise be destroyed. The initial (limited) trial resulted in significant benefits over the last 2 months:
  - » 60kg of items diverted from landfill.
  - » 100kg of waste emissions diverted from landfill.

Next steps for 2023/24

- Progressing the recommendations from the Waste Audit 'Opportunities Identified Report'.
- Addressing paper towel use which is one of the highest waste generating activities at ESR.

Tā mātou kāri tapeke

# Our scorecard

## Summary results

Overall performance is solid for our core suite of measures, with 29 of 31 either Achieved, Partially achieved, or In progress. The reasons for a Partially achieved/In progress result are explained in the commentary under the relevant measure. The two measures that were not achieved relate to stretch targets for the number of research projects and international proposals, however, overall performance in these areas is good. Details are listed below.

| | |
|---|---|
| **Achieved** | 17 |
| **Partially achieved / In progress** | 12 |
| **Not achieved** | 2 |

## Full year-end results

### Strategic objective: Reshaping integrated thought leadership

| Investment | Performance measure | FY23 target | FY23 result |
|---|---|---|---|
| **Demonstrating co-design and innovation** | Number of project proposals that are approved for Innovation Funding by the NZ Police/ESR Strategic Governance Board. | 4 projects | Partially Achieved |
| **Demonstrating co-design and innovation** | Number of projects where co-designed workshops are undertaken between NZ Police and ESR. | 2 co-design workshops | Partially Achieved |
| *Comment: During 2022/23 there were two project proposals approved for Innovation Funding and one project where co-designed workshops were undertaken between NZ Police and ESR. This outcome has been mainly due to scheduling difficulties limiting the level of planned activity.* | | | |
| **Building an innovation pipeline** | Number of research projects awarded KiwiNet Tier 1 Pre-Seed funding by the KiwiNet Investment Committee. | 4 projects | Partially Achieved |
| **Building an innovation pipeline** | Number of research projects awarded KiwiNet Tier 2 Pre-Seed funding by the KiwiNet Investment Committee. | 2 projects | Not Achieved |

| Investment | Performance measure | FY23 target | FY23 result |
|---|---|---|---|
| **Building an innovation pipeline** | Number of Emerging Innovator applications awarded by KiwiNet Investment Committee. | 2 researchers | Partially Achieved |
| *Comment: During 2022/23 there were three projects awarded KiwiNet Tier 1 Pre-Seed funding, and no projects awarded Tier 2 funding by the KiwiNet Investment Committee. There was one Emerging Innovator application awarded.* | | | |
| **Building an innovation pipeline** | Upskill ESR's scientists in achieving impact through innovation. | ≥20% of ESR's science staff have participated in science innovation workshops | Achieved |
| **Shaping and developing ESR's commercialisation approach** | ESR's commercialisation framework proposal is developed and implemented:<br>• innovation pipeline structure defined<br>• project mapping completed. | Innovation pipeline structure defined and project mapping completed | Partially Achieved |
| *Comment: Project mapping was completed in 2022/23. Being dynamic in nature, the innovation pipeline is under constant evaluation. Work is ongoing to identify the optimal structure.* | | | |
| **He Wai Māpuna programme** | Co-designed projects with iwi increase from the FY22 target. | ≥8 | Partially Achieved |
| *Comment: He Wai Māpuna has five iwi partners located across Aotearoa. At this time it is intended to focus on deepening these five partnerships rather than expansion.* | | | |
| **Kaupapa Māori or Māori led research projects or services across ESR** | Percentage increase from FY22 baseline in the number of co-designed research projects with iwi. | ≥12% | Achieved |
| *Comment: During 2022/23 there was a 28% increase in the number of co-designed research projects with iwi.* | | | |
| **Strategic Science Investment Fund (SSIF) funding allocation** | Percentage SSIF funding allocated to projects led by and co-designed with Māori. | ≥12% | Achieved |
| *Comment: During 2022/23 a total of 17% of SSIF funding was allocated to projects led by and co-designed with Māori.* | | | |
| **SSIF research impact** | Percentage SSIF investment in cross-platform multi-disciplinary projects. | ≥10% | Achieved |
| *Comment: During 2022/23 a total of 10.4% of SSIF investment was in cross-platform multi-disciplinary projects.* | | | |
| **Māori data sovereignty programme** | Develop a Māori data sovereignty treaty in practice framework. | Phase two of the programme is delivered by the end of FY23 | In progress |

| Investment | Performance measure | FY23 target | FY23 result |
|---|---|---|---|
| *Comment: We have developed a draft Māori data sovereignty framework, and are now identifying pilot projects to test that the draft framework is fit for purpose.* | | | |
| **Uplifting mātauranga Māori capability** | Number of new scientists employed as full-time equivalents to uplift mātauranga Māori capability. | 5 FTE | Partially Achieved |
| *Comment: During 2022/23 three FTEs were employed to uplift mātauranga Māori science capability.* | | | |
| **Strengthening ESR's data science and uplifting capability** | Develop and implement ESR's data science strategy. | Strategy implemented | Achieved |
| *Comment: Our data science strategy was successfully developed and implemented during 2022/23 and will guide our utilisation of leading-edge data science research in coming years.* | | | |

## Strategic objective: Growing strategic and long-term sustainable partnerships

| Investment | Performance measure | FY23 target | FY23 result |
|---|---|---|---|
| **Increasing international research collaboration** | Number of international proposals submitted and accepted. | ≥3 | Not Achieved |
| *Comment: No international proposals were submitted during 2022/23.* | | | |
| **Overall success rate of external research bids** | Overall success rate of external research bids. | ≥15% | Achieved |
| *Comment: A total of 12 bids were led by ESR and decided in 2022/23, with three being successful (25%).* | | | |
| **Extending ESR's research capacity and strengthening ties with New Zealand universities** | Number of science graduates recruited to support research activity, innovation and increase ESR's research paper output. | 2 doctoral students | Partially Achieved |
| | | 2 post-doctoral students | Achieved |
| | | 1 summer intern undergraduate | Achieved |
| | | 2 graduate students | Achieved |
| *Comment: During 2022/23 ESR recruited one doctoral student, two postdoctoral students, one summer student, and three graduate students to support research activity, innovation, and increase ESR's research paper output. An additional 0.2 FTE Professor in Toxicology and Health was seconded to ESR from the University of Otago.* | | | |

## Strategic objective: Developing a thriving organisational culture and demonstrating our commitment to Māori

| Investment | Performance measure | FY23 target | FY23 result |
|---|---|---|---|
| **Ensuring a workforce capability framework is in place to assess workforce skills, development needs and priority investment areas to grow capability** | Develop ESR's workforce capability framework. | Workforce capability framework developed and implemented. | In progress |
| *Comment: This work was deferred early in the year. During 2022/23 our focus has been on developing the system infrastructure to support this work.* | | | |
| **Establish employee diversity baseline and monitor** | Establish employee diversity baseline and monitor. | Improving against an established baseline. | In progress |
| *Comment: This work was deferred early in the year. During 2022/23 our aim was to establish a baseline, which was achieved.* | | | |
| **Building foundational cultural capability and competency** | Percentage of staff who have participated in introduction te reo Māori courses. | ≥40% | Achieved |
| *Comment: During 2022/23 a total of 41% of ESR staff have participated in introductory te reo Māori courses.* | | | |
| **Building foundational cultural capability and competency** | Percentage of ESR's permanent staff who have participated in a minimum of two foundational cultural capability courses. | ≥50% | Achieved |
| *Comment: During 2022/23 a total of 52% of ESR's permanent staff have participated in a minimum of two foundational cultural capability courses.* | | | |
| **Improving ESR's health and safety processes and procedures** | Continue to evolve ESR's critical risk management programme. | Implement control plans for ESR's critical health, safety and wellbeing risks and top events by the end of FY23. | Achieved |
| *Comment: All of the planned Critical Risk Control Actions were implemented during 2022/23. Progress against ESR's Critical Risk Milestones was monitored and assurance reports provided to both SLT and the Board.* | | | |

## Strategic objective: Strengthening business systems and processes

| Investment | Performance measure | FY23 target | FY23 result |
|---|---|---|---|
| **Establishing and implementing a project management office (PMO) to support integrated decision-making** | PMO is resourced and implemented by the end of FY23. | PMO implemented | Achieved |
| **Strengthening ESR's business resilience and continuity maturity** | ESR's business resilience and continuity maturity are managed or enhanced. | Resilience is maintained at level 4 | In progress |
| *Comment: ESR's business continuity work programme started in early 2020 and has seen ESR continue to uplift integrated organisational business continuity management practices relating to business resilience, coordination, recovery and leadership.*<br>*During 2022/23 over 50 staff from various business groups have attended a one-day Co-ordinated Incident Management course. In addition, over 80 staff have received training on Iluminr – the crisis management platform that we use.* | | | |
| **Deliver initiatives in ESR's Enterprise Technology Roadmap** | Investment decisions are recommended based on the ESR-wide technology roadmap, focus areas are cloud-based services and security and public health surveillance. | Strategic investments are implemented and system resilience improved. | Achieved |
| *Comment: During 2022/23 all technology investment decisions were based on the ESR-wide technology roadmap. This roadmap will continue to set the direction for future technology investments. Focusing on modernisation of key systems, security and where appropriate, a move to Cloud, has improved overall system resilience.* | | | |
| **Strengthening ESR's cyber security maturity** | ESR's cyber security maturing rating is managed or enhanced. | Improving or maintained | Achieved |
| *Comment: ESR's cyber security rating improved during 2022/23. As initiatives within the security programme are delivered, ESR's cyber security risk rating will continue to show improvement.* | | | |
| **Information management governance and maturity** | ESR's information management maturity is managed or enhanced. | Establish baseline | Achieved |
| *Comment: A baseline was successfully established, which included undertaking an audit across the organisation of our information assets, and we are commencing actions to address areas of improvement.* | | | |
| **Sustainable business practices and participating in the pan-CRI sustainability initiative** | ESR's total corporate emissions of carbon dioxide equivalent is managed or improved. | Establish baseline | Achieved |
| *Comment: We established an unaudited baseline for FY19 of 4785 tCO2e. During 2023 we are auditing our FY19 base year with Toitū to establish meaningful measures and targets.* | | | |

## Ministry of Business, Innovation and Employment core generic performance indicators

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

| Strategic objectives | Performance measure | Purpose | FY22 Year-end result | FY23 budget or target | FY23 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. | $163,530 | $165,000 | $173,813 |
| | **Financial indicators:** revenue per FTE | $ amount of revenue per FTE. | $210,579 | $212,000 | $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). | 4.25 | 4.0 | 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. | 65 | 80 | 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. | 0.20 | 0.39 | 0.18 |

*Calculated for a calendar year, although reported as at 30 June 2023, this result is calculated for a calendar year (1 January to 31 December 2022).

## Key financial measures

| | Actual 2023 | Budget 2023 | Actual 2022 |
|---|---|---|---|
| Revenue | $124m | $124m | $111m |
| Operating margin<br>*Earnings before interest, tax, depreciation and amortisation (EBITDA) as a percentage of revenue* | 5.2% | 8.0% | 6.8% |
| Return on equity<br>*Net profit after taxation as a percentage of equity* | 0.1% | 3.5% | 0.8% |
| Return on equity excluding one-off Workday Human Capital Management and Finance system implementation costs | n/a | n/a | 5.2% |
| Return on assets<br>*Earnings before interest and tax as a percentage of total assets* | -0.5% | 2.4% | 0.5% |
| Profit volatility<br>*The standard deviation of EBITDA as a percentage of average EBITDA over the preceding 7 years* | 24% | 40% | 16% |
| Acid test ratio<br>*Current assets excluding prepayments and inventory to current liabilities excluding deferred revenue* | 2.7 | 2.3 | 2.3 |
| Equity ratio<br>*Equity as a percentage of total assets* | 56.6% | 67.0% | 63.1% |
| Gearing<br>*Debt (including lease liabilities) as a percentage of debt and equity* | 5.7% | 5.0% | 6.0% |
| Revenue per full time equivalent employee | $219,900 | $212,000 | $211,000 |
| Operating margin per full time equivalent employee<br>*Earnings before interest, tax, depreciation and amortisation, per average full time equivalent employee for the year* | $11,300 | $17,808 | $14,300 |

Te Mana Whakahaere me Te Rōpū Kaihautūa

# Governance and Senior Leadership Team

## 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 Research, Science and Innovation. 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 Research, Science and Innovation 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 an independent Strategic Science Advisory Panel. The Board and its committee members are subject to ESR's Code of Conduct.

In June 2023, our Board welcomed the appointment of Professor Sarah Young as Chair and new directors Catherine Abel-Pattinson, Sir Ashley Bloomfield KNZM, and Dr Bruce Campbell CNZM. We also farewelled former Chair Denise Church in September 2022, and Acting Chair Professor Cristin Print and director Dr Andy Shenk in May 2023. The Board and Senior Leadership Team extend their thanks and appreciation to these former directors for their commitment and expertise in science, technology and innovation, which has been vital in helping ESR grow our thinking and ambition to achieve more for Aotearoa New Zealand.

## 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 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.

### *Justine Gilliland*

Justine Gilliland was appointed to the ESR Board in February 2022. Justine is an independent director and strategy consultant. She is currently on the boards of Manaaki Whenua Landcare Research; the Agricultural and Marketing Research and Development Trust; health provider Tui Ora; Economic Development New Zealand; UniMed and ESR, along with advisory and project governance groups in the energy, food and beverage, and agritech industries. Justine is the former Chief Executive of Venture Taranaki.

Before Venture Taranaki, Justine was Deputy Director-General Sector Partnerships and Programmes at the Ministry for Primary Industries. There she led multi-million-dollar investment and research and development programmes, Māori partnerships, regional development, and previously ran the Ministry's research and development and other external grants and funds.

Her consulting work is currently mainly focused on developing offshore wind energy for New Zealand. Justine holds law and arts degrees and has been admitted as barrister and solicitor of the High Court of New Zealand.

### *Dr Melissa McLeod*

Dr Melissa McLeod was appointed to the ESR Board in February 2022. Melissa is a public health physician and epidemiologist at the University of Otago in Wellington. She teaches postgraduate epidemiology and general public health and brings rich research expertise in Māori health, epidemiology (including quantitative aspects of kaupapa Māori research) and the investigation and elimination of ethnic health inequities in New Zealand.

Mel has recently been involved in the PHARMAC review and was an appointed member of the Ministry of Health National Public Health Service Establishment Advisory Group Review. She also sits on the Bowel Screening Advisory Group.

### *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 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 was New Zealand's Director-General 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. Sir Ashley's professional areas of interest are non-communicable disease prevention and control and addressing health inequities.

### *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 & 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 focused 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.

### *Denise Church QSO, CFInstD (Chair until September 2022)*

Denise Church is a Wellington based company director and consultant who was appointed as Chair of the ESR Board in July 2015. She is also Chair of Airways New Zealand and serves on the boards of Predator Free Wellington and the Scouts Youth Foundation.

Denise has wide-ranging governance experience, including as Chair of Zealandia, and has held other governance appointments in the health, tertiary education and science sectors. In her consulting practice, Leadership Matters, Denise focuses on strategy and leadership. Denise has also been Chief Executive of the Ministry for the Environment. She holds degrees in zoology, economics, resource management and urban and regional planning. Denise's tenure as a Board member with ESR finished at the end of September 2022.

### *Professor Cristin Print, (Deputy Chair) (Acting Chair October 2022 – 31 May 2023)*

Professor Cristin Print is a medically qualified biomedical scientist who joined the ESR Board in August 2017. He has a 25-year career in academic medical research and biotechnology, including work in Australia, the United Kingdom and Japan. He is a professor in the University of Auckland's Department of Molecular Medicine and Pathology, where he uses genomic and bioinformatic technologies alongside traditional pathology to better understand human disease.

Cris is currently Chair of the Auckland Regional Tissue Bank's Scientific Advisory Board, a principal investigator in the Maurice Wilkins Centre and leads the Genomics Into Medicine Strategic Research initiative in Auckland. Cristin's tenure as a Board member with ESR finished at the end of May 2023.

### *Dr Andy Shenk (Until 31 May 2023)*

Dr Andy Shenk was appointed to the ESR Board in August 2017. Andy graduated with a doctorate in biological sciences from the University of Delaware, Newark, United States of America. He has had a 30-year career spanning academic research, management and governance in biotechnology and nutrition start-up companies, and senior management in a major corporate.

Andy currently works across many fields of research, development and commercialisation of intellectual property, including early-stage investment in new technologies here in New Zealand and overseas. Andy's tenure as a Board member with ESR finished at the end of May 2023.

### *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' 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.

### *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. Any such costs are authorised by the Chair or, in the case of the Board Chair, the Chair of the Risk and Assurance Committee. During 2022/23, directors attended both face-to-face and online governance development activities.

### *Board activity in 2022/23*

During 2022/23, 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)
- Denise Church (until 30 September 2022)
- Professor Cristin Print (until 31 May 2023)
- Justine Gilliland
- Dr Mel McLeod

### *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:

- Professor Cristin Print (Chair) (until 31 May 2023)
- Denise Church (until 30 September 2022)
- Dr Mel McLeod
- Dr Andy Shenk (until 31 May 2023)
- Kate Thomson

### *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)
- Professor Cristin Print (until 31 May 2023)
- Justine Gilliland
- Dr Mel McLeod

## Board and Board committee attendance for the year ending 30 June 2023

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 12 meetings, including the Annual General Meeting, in the year ended 30 June 2023. 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 12) | Risk and Assurance Committee (out of 4) | People, Culture and Performance Committee (out of 5) | Property Development Committee (out of 5) |
|---|---|---|---|---|
| **Professor Sarah Young**[a] | 1/1 | | 1/1 | |
| **Catherine Abel-Pattinson**[a] | 1/1 | | | |
| **Sir Ashley Bloomfield**[a] | 1/1 | | | |
| **Dr Bruce Campbell**[a] | 1/1 | | | |
| **Justine Gilliland** | 10/12 | 4/4 | | 5/5 |
| **Dr Matt Glenn** | 10/12 | | | 5/5 |
| **Dr Mel McLeod** | 11/12 | 3/3[d] | 4/4 | |
| **Kate Thomson** | 12/12 | 4/4 | 2/4 | 4/5 |
| **Denise Church**[b] | 3/3 | 1/1 | 1/1 | 1/1 |
| **Professor Cristin Print**[c] | 11/11 | 2/3[d] | 4/4 | 2/4[d] |
| **Dr Andy Shenk**[c] | 10/11 | | 3/4 | |

[a]From 1 June 2023. [b]Until 30 September 2022. [c]Until 31 May 2023. [d]From 1 October 2022.

### *Dividends*

No dividends have been declared or paid in respect of the 2023 financial year.

### *Donations*

The ESR group made koha and donations of $3,445 during the 2023 financial year.

## 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 2023, 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
- Member of the New Zealand Nurses Society
- 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)

*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 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)
- Director, New Zealand Winegrowers Research Centre Limited
- Trustee, Kerikeri Peninsula Conservation 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/Trustee, Agricultural and Marketing Research and Development Trust (AGMARDT)
- Member, Advisory Group, Tourism Innovation Hub (Tātaki Auckland Unlimited)
- Chair, Advisory Board, Begin Distilling Ltd
- Chair, SFFF Robotic Asparagus Harvester programme
- 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 Matt Glenn*

- CEO, The Kiwifruit Breeding Centre
- Director and Shareholder, Idea Partners Limited
- Director, PlantTech Research Institute

*Dr Melissa McLeod*

- Senior Lecturer, Department of Public Health, University of Otago, Wellington
- Fellow, New Zealand College of Public Health Medicine
- Director, DRTS Concepts Limited
- 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

*Denise Church*
*(disclosures to 30 September 2022)*

- Director and Shareholder, Leadership Matters Limited
- Trustee, Scout Youth Foundation, including related appointments to SANZ Trustee Company Limited (Director)
- Brookwood Estate Ltd (Director) (Lorna Maisie Eade Memorial Trust)
- Te Roto Ltd (Director) (Mathias Paulson Memorial Trust)
- Jack and Tui Lacas Trust
- Tatum Scout Memorial Trust
- Director, Predator Free Wellington Ltd
- Chair, Airways NZ

*Professor Cristin Print*
*(disclosures to 31 May 2023)*

- Professor, Department of Molecular Medicine & Pathology, University of Auckland (including Facilitation of a Joint Graduate School in Forensics, Medical and Health Sciences)
- Principal Investigator, Maurice Wilkins Centre
- Member, Cancer Research Trust NZ Board
- Member, New Zealand eScience Infrastructure Research Reference Group
- Chair, Auckland Regional Biobank Scientific Advisory Board
- Co-leader, MBIE/Genomics Aotearoa Precision Medicine Pathfinder Project
- Bioinformatics Director, Grafton Clinical Genomics
- Interim Co-Chair, Aotearoa Genomic Healthcare Alliance

*Dr Andy Shenk*
*(disclosures to 31 May 2023)*

- CEO, Auckland UniServices Limited

## *Directors' indemnity*

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

## *Disclosure of directors' remuneration*

### *Directors' remuneration*

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

| Directors' remuneration | Total | |
|---|---|---|
| **Professor Sarah Young (Chair)** | $4,005 | Appointed 1 June 2023 |
| **Catherine Abel-Pattinson** | $2,003 | Appointed 1 June 2023 |
| **Sir Ashley Bloomfield** | $2,003 | Appointed 1 June 2023 |
| **Dr Bruce Campbell** | $2,003 | Appointed 1 June 2023 |
| **Justine Gilliland** | $24,032 | |
| **Dr Matt Glenn** | $24,032 | |
| **Dr Melissa McLeod (People, Culture and Capability Chair)** | $24,032 | |
| **Kate Thomson (Risk and Assurance Chair)** | $28,032 | |
| **Denise Church** | $12,016 | Term ended 30 September 2022 |
| **Professor Cristin Print** | $39,553 | Term ended 31 May 2023 |
| **Dr Andy Shenk** | $22,029 | Term ended 31 May 2023 |
| **Total** | $183,740 | |

# Strategic Science Advisory Panel

The Board's Strategic Science Advisory Panel (SSAP) 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 provides our Board with their insights on ESR's science quality, strategy, and involvement in and uptake of new international developments.

The panel also provides comment on the competitiveness and quality of ESR's science activities, with suggestions for improvement and any other science advice as requested by the Board. During the year the Board invited the SSAP to undertake reviews into environmental DNA (eDNA) and Precision Health. These reviews were high level strategic exploration of these issues and provided the Board and management with insights and reflections to guide potential opportunities for ESR to pursue.

Members of the panel during the year consisted of:

- Dr Liz Jazwinska (Chair)
- Professor James Curran
- Dr Kēpa Morgan

## 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 & 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 (2016–20). 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 (2011–14), 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 (2007–11).

### *Dr Kēpa Morgan*

Pou Hautū 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.

# 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 ESR's SLT is to manage the day-to-day operations of ESR on behalf of the Board and the shareholding Ministers.

## Senior leadership team members 1 July 2022 to 30 June 2023

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

Photo from left to right:

***Dr Wim Nijhof***
Acting Joint General Manager Health and Environment – Environment (until April 2023)
General Manager Environment (from May 2023)

***Natalie Lombe***
General Manager People and Culture

***Mark Ottaway***
General Manager Business Services

***Dr Brett Cowan***
Chief Scientist

***Peter Lennox***
Chief Executive

***Trish Bolger***
General Manager People and Culture (until 4 December 2022)
General Manager Strategy (from 5 December 2022)

***Jymal Morgan***
General Manager Māori Impact

***Dr Jill Vintiner***
Joint General Manager Health and Environment – Health (until February 2023) General Manager Health (from March 2023)

***John Bone***
General Manager Forensics

## Chief Executive remuneration

### *Chief Executive remuneration summary 2019-2023*

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[a] | STI[b] | Percentage STI against maximum | Benefits[c] | Total |
|---|---|---|---|---|---|---|
| **Peter Lennox** | 2023 | $570,187 | n/a | n/a | $17,571 | $587,758 |
| | 2022 | $504,858 | n/a | n/a | $15,594 | $520,452 |
| | 2021 | $454,372 | n/a | n/a | $14,048 | $468,420 |
| **Keith McLea** | 2021 | $134,961 | n/a | n/a | $19 | $134,980 |
| | 2020 | $508,210 | n/a | n/a | $533 | $508,743 |
| | 2019 | $394,746 | $89,200 | 81% | $599 | $484,545 |

[a] *Chief Executive remuneration since 2020 has not included a short-term incentive (STI) component.*

[b] *STIs are shown for the year to which they relate but were unpaid as at that balance date.*

[c] *Benefits comprise insurance cover and employer KiwiSaver contributions.*

### *Senior leadership remuneration 2019–2023*

The total combined remuneration of our senior leadership (excluding the Chief Executive's remuneration) from 2019–2023 was:

| Financial year | Salary and STI[a] | Benefits[b] | Total |
|---|---|---|---|
| 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 |
| 2019 | $1,827,863 | $55,489 | $1,883,352 |

[a] *Senior leadership remuneration since 2020 has not included a short-term incentive (STI) component. STIs are shown for the year to which they relate but were unpaid as at that balance date.*

[b] *Benefits comprise insurance and employer KiwiSaver contributions.*

## Employee remuneration

As at 30 June 2023, the following total remuneration above $100,000 was paid to 237 employees:

| Remuneration range | No. of staff |
|---|---|
| $100,000 – $109,999 | 39 |
| $110,000 – $119,999 | 47 |
| $120,000 – $129,999 | 28 |
| $130,000 – $139,999 | 32 |
| $140,000 – $149,999 | 20 |
| $150,000 – $159,999 | 15 |
| $160,000 – $169,999 | 7 |
| $170,000 – $179,999 | 13 |
| $180,000 – $189,999 | 13 |
| $190,000 – $199,999 | 4 |
| $200,000 – $209,999 | 4 |
| $210,000 – $219,999 | 1 |
| $220,000 – $229,999 | 1 |
| $230,000 – $239,999 | 3 |
| $240,000 – $249,999 | 1 |
| $260,000 – $269,999 | 2 |
| $270,000 – $279,999 | 1 |
| $280,000 – $289,999 | 1 |
| $290,000 – $299,999 | 1 |
| $300,000 – $309,999 | 2 |
| $310,000 – $319,999 | 1 |
| $580,000 – $589,999 | 1 |
| **Total** | **237** |

Te whakahaere pūtea me ngā tauākī pūtea

# Financial performance and statements

# 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 2023**

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 66 to 91, that comprise the Statement of Financial Position as at 30 June 2023, 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 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 2023; and
  - its financial performance and cash flows for the year then ended; and
- comply with generally accepted accounting practice in New Zealand in accordance with New Zealand Equivalents to International Financial Reporting Standards and International Financial Reporting Standards.

Our audit was completed on 20 September 2023. This is the date at which our opinion is expressed.

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

## Basis for our opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the Professional and Ethical Standards and the International Standards on Auditing (New Zealand) 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 62 and 92 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* 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 assurance relating to the Group's Report of Federal Awards in accordance with the United States Office of Management and Budget's (OMB) Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (commonly called "Uniform Guidance") for the year ended 30 June 2022 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

# Financial statements

## Statement of Profit or Loss and Other Comprehensive Income

For the Year Ended 30 June 2023

| Group | Note | Group Actual 2023 $'000s | Group Budget 2023 unaudited $'000s | Group Actual 2022 $'000s |
|---|---|---|---|---|
| **Revenue** | | | | |
| Revenue from contracts with customers | **2** | 109,574 | 111,311 | 98,531 |
| Government grants | **2** | 13,996 | 12,234 | 12,234 |
| | | **123,570** | **123,545** | **110,765** |
| **Operating expenses** | | | | |
| Scientific materials | | 10,873 | 11,158 | 10,153 |
| Subcontracting, commissions and royalties | | 15,435 | 12,641 | 11,683 |
| Personnel | | 68,989 | 68,468 | 61,688 |
| Depreciation and amortisation | **5/6** | 6,926 | 8,257 | 7,061 |
| Other expenses | **3** | 21,898 | 20,894 | 19,753 |
| | | **124,121** | **121,418** | **110,338** |
| **Operating (loss)/profit** | | **(551)** | **2,127** | **427** |
| Interest income | | 1,224 | 903 | 516 |
| Finance expense | | (150) | (153) | (138) |
| | | **1,074** | **750** | **378** |
| **Profit before income tax expense** | | **523** | **2,877** | **805** |
| Income tax expense | **4** | 439 | 806 | 310 |
| **Profit for the year attributable to the shareholder of the parent** | | **84** | **2,071** | **495** |
| Other comprehensive income | | - | - | - |
| **Total profit or loss and other comprehensive income for the year attributable to the shareholder of the parent** | | **84** | **2,071** | **495** |

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

## Statement of Changes in Equity

For the Year ended 30 June 2023

| Group | Note | Share Capital $'000s | Retained earnings $'000s | Total equity $'000s |
|---|---|---|---|---|
| **Balance at 30 June 2021** | | **8,494** | **51,633** | **60,127** |
| Profit for the year | | - | 495 | 495 |
| Other comprehensive income | | - | - | - |
| **Total comprehensive income** | | **-** | **495** | **495** |
| **Balance at 30 June 2022** | | **8,494** | **52,128** | **60,622** |
| | | | | |
| **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** |

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

## Statement of Financial Position

As at 30 June 2023

| Group | Note | Group Actual 2023 $'000s | Group Budget 2023 unaudited $'000s | Group Actual 2022 $'000s |
|---|---|---|---|---|
| **Non-current assets** | | | | |
| Property, plant and equipment | **5** | 35,809 | 31,177 | 29,382 |
| Right-of-use assets | **7** | 3,563 | 3,093 | 3,844 |
| Other investments | | 30 | 30 | 30 |
| Investment cash | | 2,000 | 4,000 | 8,000 |
| Intangible assets | **6** | 4,627 | 5,899 | 4,979 |
| Deferred taxation | **13** | 1,509 | 2,716 | 1,743 |
| | | **47,538** | **46,915** | **47,978** |
| **Current assets** | | | | |
| Cash and cash equivalents | **8** | 12,546 | 1,688 | 2,037 |
| Investment cash | | 28,500 | 26,034 | 31,023 |
| Trade and other receivables | **9** | 11,843 | 10,650 | 9,442 |
| Contract assets | **2** | 4,479 | 2,714 | 4,616 |
| Inventories – scientific materials and consumables | | 1,060 | 1,024 | 1,035 |
| Derivative financial instruments | **19** | 28 | - | - |
| Income tax receivable | **12** | 1,211 | - | - |
| | | **59,667** | **42,110** | **48,153** |
| **Current liabilities** | | | | |
| Trade and other payables | **10** | 13,260 | 11,265 | 13,327 |
| Contract liabilities | **2** | 9,371 | 6,656 | 8,892 |
| Government grants received in advance | **2** | 10,942 | - | - |
| Employee benefits | **11** | 7,305 | 5,300 | 6,580 |
| Lease liability | **7** | 400 | 350 | 344 |
| Derivative financial instruments | **19** | - | - | 15 |
| Income tax payable | **12** | - | 269 | 802 |
| | | **41,278** | **23,840** | **29,960** |
| **Net current assets** | | **18,389** | **18,270** | **18,193** |

## Statement of Financial Position (continued)

| Group | Note | Group Actual 2023 $'000s | Group Budget 2023 unaudited $'000s | Group Actual 2022 $'000s |
|---|---|---|---|---|
| **Non current liabilities** | | | | |
| Employee benefits | **11** | 1,962 | 2,438 | 2,010 |
| Lease liability | **7** | 3,259 | 3,101 | 3,539 |
| | | **5,221** | **5,539** | **5,549** |
| **Net assets** | | **60,706** | **59,646** | **60,622** |
| **Equity** | | | | |
| Share capital | **14** | 8,494 | 8,494 | 8,494 |
| Retained earnings | | 52,212 | 51,152 | 52,128 |
| **Total equity** | | **60,706** | **59,646** | **60,622** |

The Board of Directors of the Institute of Environmental Science and Research Limited authorised these financial statements for issue on 20 September 2023.

On behalf of the Board:

**Professor Sarah Young**
Chair
20 September 2023

**Kate Thomson**
Risk and Assurance Chair
20 September 2023

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

## Statement of Cash Flows

For the Year Ended 30 June 2023

| Group | Note | Group Actual 2023 $'000s | Group Budget 2023 unaudited $'000s | Group Actual 2022 $'000s |
|---|---|---|---|---|
| **Cash flows from/(used in) operating activities** | | | | |
| *Cash was provided from:* | | | | |
| Customers and grants | | 133,910 | 123,433 | 110,741 |
| Interest received | | 902 | 903 | 502 |
| | | **134,812** | **124,336** | **111,243** |
| *Cash was applied to:* | | | | |
| Suppliers and employees | | (117,106) | (112,527) | (99,893) |
| Interest paid | | (4) | - | - |
| Income tax paid | **12** | (2,218) | (1,002) | (1,819) |
| | | **(119,328)** | **(113,529)** | **(101,712)** |
| **Net cash inflow from operating activities** | **15** | **15,484** | **10,807** | **9,531** |
| **Cash flows from/(used in) investing activities** | | | | |
| *Cash was provided from:* | | | | |
| Investment cash maturities | | 33,523 | 32,000 | 36,049 |
| | | **33,523** | **32,000** | **36,049** |
| *Cash was applied to:* | | | | |
| Purchase of property, plant and equipment | | (10,270) | (10,367) | (6,641) |
| Purchase of intangible assets | | (2,673) | (3,300) | (1,066) |
| Transfers to investment cash | | (25,000) | (29,011) | (37,523) |
| | | **(37,943)** | **(42,678)** | **(45,230)** |
| **Net cash outflow from investing activities** | | **(4,420)** | **(10,678)** | **(9,181)** |
| **Cash flows used in financing activities** | | | | |
| *Cash was provided applied to:* | | | | |
| Repayment of lease liabilities | | (555) | (491) | (495) |
| **Net cash outflow from financing activities** | | **(555)** | **(491)** | **(495)** |
| **Net increase/(decrease) in cash held** | | **10,509** | **(362)** | **(145)** |
| Cash and cash equivalents at the beginning of the year | | 2,037 | 2,050 | 2,182 |
| **Cash and cash equivalents at the end of the year** | **8** | **12,546** | **1,688** | **2,037** |

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

# Notes to the Financial Statements

## 1. Statement of significant 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 2023.

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 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 around the probability of future economic benefits arising from that expenditure. In particular, judgement is 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 significant accounting policies adopted in the preparation of these financial statements are provided throughout the notes to the financial statements.

### *Comparatives*

When the presentation or classification of items in the financial statements is amended or accounting policies are changed voluntarily, comparative figures are restated to ensure consistency with the current period unless it is impractical to do so.

### *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*

The Group has elected not to early adopt any other new standards or amendments to existing standards which have been issued but not yet effective as at 30 June 2023. It is anticipated that these standards will not significantly affect the financial statements of the Group once adopted.

## 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 good or service to the customer.

*i. Disaggregated revenue information*

| 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** |

| Group – year ended 30 June 2022 | Domestic $'000s | International $'000s | Total $'000s |
|---|---|---|---|
| Core government contracts | 71,239 | - | 71,239 |
| Research | 8,668 | 3,846 | 12,514 |
| Commercial products and services | 3,915 | 10,863 | 14,778 |
| | **83,822** | **14,709** | **98,531** |

Note that the overall research output of the Group includes activity funded by $13,996,000 (2022: $12,234,000) 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 $17,179,000 as at 30 June 2023 (2022: $12,069,000), split between current and non-current as below:

| | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Current | 14,787 | 10,063 |
| Non-current | 2,392 | 2,006 |
| | **17,179** | **12,069** |

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 | 2023 $'000 | 2022 $'000 | 2021 $'000 |
|---|---|---|---|
| Trade receivables | 9,452 | 7,876 | 8,128 |
| Contract assets | 4,479 | 4,616 | 1,713 |
| Contract liabilities | 9,371 | 8,892 | 6,283 |
| Government grants received in advance | 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 $40,000 as at 30 June 2023 (2022: $387,000). These costs are initially capitalised and then amortised systematically as the related performance obligation is satisfied. Amortisation recognised in 2023 was $2,344,000 (2022: $1,908,000).

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 $4,798,000 (2022: $2,524,000) 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 $8,000,000 (2022: nil) relating to the Infectious Disease Platform (Te Niwha) out of which $7,446,000 (2022: nil) is recognised as Government grants received in advance as at 30 June 2023.

ESR also received $3,495,000 (2022: nil) from the Ministry of Health in 2023 for a sequencing lab 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 is recorded within assets under construction.

## 3. Other expenses

| Group | Note | 2023 $'000 | 2022 $'000 |
|---|---|---|---|
| Communication costs (including network charges) | | 283 | 280 |
| Depreciation expense on right-of-use assets | | 410 | 506 |
| Directors' expenses | | 32 | 20 |
| Directors' fees | **18** | 184 | 192 |
| Fair value (gain) on forward exchange contract | | (60) | (16) |
| Fees paid to PricewaterhouseCoopers for: | | | |
| • the audit of the statutory financial statements | | 258 | 201 |
| • other assurance services* | | 47 | 43 |
| IT systems maintenance and licence costs | | 4,517 | 3,442 |
| Legal and consulting fees | | 2,326 | 3,435 |
| Occupancy and insurance | | 4,101 | 3,789 |
| Office and administration | | 2,471 | 2,629 |
| Other operating costs | | 739 | 201 |
| Outsourced costs | | 4,087 | 4,207 |
| Rental and lease costs | | 320 | 226 |
| Restructuring expense | | 141 | 79 |
| (Reversal of impairment) / impairment of receivables | | (42) | 4 |
| Travel | | 2,084 | 515 |
| **Total other expenses** | | **21,898** | **19,753** |

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 relate to the Group's Report of Federal Awards in accordance with the OMB Uniform Guidance Program Provisions.

## 4. Taxation

| Group | Note | 2023 $'000s | 2022 $'000s |
|---|---|---|---|
| *The taxation charge has been calculated as follows:* | | | |
| **Profit before income tax expense** | | **523** | **805** |
| Prima facie taxation at 28% | | 146 | 225 |
| Plus taxation effect of: | | | |
| Net prior period adjustments | | 251 | 51 |
| Non-deductible items | | 42 | 34 |
| **Tax expense for the year** | | **439** | **310** |
| *The tax expense for the year is represented by:* | | | |
| Current taxation | **12** | 205 | 1,873 |
| Deferred taxation | **13** | 234 | (1,563) |
| **Tax expense for the year** | | **439** | **310** |

## 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 the statement of profit or loss and other comprehensive income.

Realised gains and losses arising from the disposal of property, plant and equipment are recognised in the profit or loss and other comprehensive income 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 – 50 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 2021** | | | | | | |
| Cost | 476 | 33,789 | 7,959 | 37,984 | 112 | 80,320 |
| Accumulated Depreciation | - | (16,203) | (6,115) | (31,162) | - | (53,480) |
| **Net book value at the end of the year** | **476** | **17,586** | **1,844** | **6,822** | **112** | **26,840** |
| **Year ended 30 June 2022** | | | | | | |
| Net book value at the beginning of the year | 476 | 17,586 | 1,844 | 6,822 | 112 | 26,840 |
| Additions | - | 387 | 1,263 | 2,484 | 3,297 | 7,431 |
| Transfers from assets under construction | - | 101 | 10 | 1 | (112) | - |
| Disposals | - | - | - | (5) | - | (5) |
| Depreciation for the year | - | (1,874) | (1,179) | (1,831) | - | (4,884) |
| **Net book value at the end of the year** | **476** | **16,200** | **1,938** | **7,471** | **3,297** | **29,382** |
| **At 30 June 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** |
| **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** |

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

ESR has plans to redevelop the Kenepuru Science Centre. The useful life of 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 associated with the redevelopment of the Kenepuru Science Centre are included within assets under construction.

Property, plant and equipment assets not yet ready to use are not subject to depreciation and are tested annually for impairment. The Group has considered the current business case for the redevelopment of the Kenepuru Science Centre and determined no impairment of assets under construction is required.

*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 ten 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 (SaaS) arrangements*

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 (2022: 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 2021** | | | | | |
| Cost | 4,916 | 15,366 | 1,338 | 844 | 22,464 |
| Accumulated amortisation and impairment losses | (4,580) | (10,456) | (1,338) | - | (16,374) |
| **Net book value at the end of the year** | **336** | **4,910** | **-** | **844** | **6,090** |
| **Year ended 30 June 2022** | | | | | |
| Net book value at the beginning of the year | 336 | 4,910 | - | 844 | 6,090 |
| Additions | 26 | 246 | - | 794 | 1,066 |
| Transfers from assets under construction | - | 446 | - | (446) | - |
| Amortisation for the year | (287) | (1,890) | - | - | (2,177) |
| **Net book value at the end of the year** | **75** | **3,712** | **-** | **1,192** | **4,979** |
| **At 30 June 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** |
| **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** |

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 $1,579,104 (2022: $2,197,158). The laboratory operating system has an estimated remaining useful life of four years (2022: five 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 |
| **As at 1 July 2021** | **3,514** | **6** | **3,520** | **3,520** |
| Additions and modifications to contracts | 725 | 105 | 830 | 720 |
| Depreciation expense | (485) | (21) | (506) | - |
| Interest expense | - | - | - | 138 |
| Payments | - | - | - | (495) |
| **As at 30 June 2022** | **3,754** | **90** | **3,844** | **3,883** |

| | Right-of-use assets | | | |
|---|---|---|---|---|
| | Buildings $'000s | Motor vehicles $'000s | Total $'000s | Lease liabilities $'000s |
| **As 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** |

The maturity of the lease liabilities is as follows:

| | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Less than one year | 400 | 344 |
| One to five years | 3,259 | 3,539 |
| **Total lease liabilities** | **3,659** | **3,883** |

## 8. Cash and cash equivalents

| | 2023 $'000s | 2022 $'000s |
|---|---|---|
| **Total cash and cash equivalents** | **12,546** | **2,037** |

Within the above balances includes $8,024,000 (2022: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. A provision for doubtful debts 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Trade debtors | 9,487 | 7,953 |
| Allowance for expected credit losses | (35) | (77) |
| | **9,452** | **7,876** |
| Prepayments | 2,391 | 1,566 |
| **Total trade and other receivables** | **11,843** | **9,442** |

As at 30 June 2023, trade receivables of $2,416,000 (2022: $1,588,000) 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Past due 1 – 30 days | 1,193 | 480 |
| Past due 31 – 60 days | 500 | 117 |
| Past due >61 days | 723 | 991 |
| **Total past due trade receivables** | **2,416** | **1,588** |

## 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Accrued expenses | 2,734 | 3,898 |
| GST payable | 170 | 225 |
| Trade payables | 10,356 | 9,204 |
| **Total trade and other payables** | **13,260** | **13,327** |

Employee benefits as at 30 June 2022 amounting to $906,000 previously included in trade and other payables has been reclassified to employee benefits to reflect the nature of the liability. This resulted in trade and other payables for 2022 to decrease from $14,233,000 as previously stated to $13,327,000 and current employee benefits (note 11) for 2022 to increase from $5,674,000 as previously stated to $6,580,000.

## 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Annual leave accrual | 5,776 | 5,265 |
| Service leave accrual | 403 | 324 |
| Other | 1,126 | 991 |
| **Total current employee benefits** | **7,305** | **6,580** |
| Service leave accrual | 1,889 | 1,949 |
| Retirement leave accrual | 73 | 61 |
| **Total non-current employee benefits** | **1,962** | **2,010** |

## 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Balance at the beginning of the year | 802 | 748 |
| Current year charge | 991 | 1,878 |
| Prior period adjustment | (786) | (5) |
| Provisional taxation payments | (2,218) | (1,819) |
| **Total income tax (receivable)/payable** | **(1,211)** | **802** |

## 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Balance at the beginning of the year | (1,743) | (180) |
| Prior period adjustment | 1,029 | 56 |
| Charge to settlement of profit or loss and other comprehensive income | (795) | (1,619) |
| **Total deferred taxation asset** | **(1,509)** | **(1,743)** |

| | Accelerated tax depreciation $'000s | Employee benefits $'000s | Provisions and other items $'000s | Total $'000s |
|---|---|---|---|---|
| **Year ended 30 June 2022** | | | | |
| Balance at the beginning of the year | 2,226 | (2,012) | (394) | (180) |
| Over provision in prior years | 56 | - | - | 56 |
| Current year credit to statement of profit or loss and other comprehensive income | (654) | (264) | (701) | (1,619) |
| **Total deferred taxation asset** | **1,628** | **(2,276)** | **(1,095)** | **(1,743)** |
| **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 asset** | **1,065** | **(2,506)** | **(68)** | **(1,509)** |

There are no unrecognised deferred tax assets or liabilities.

## 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| 8,494,000 ordinary $1 shares (issued and fully paid) | 8,494 | 8,494 |

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

No dividends were proposed or declared for the 30 June 2023 year (2022: 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 3 months. Investment cash movements are included in investing activities in the statement of cash flows.

| Group | Note | 2023 $'000s | 2022 $'000s |
|---|---|---|---|
| **Profit for the year after taxation** | | **84** | **495** |
| **Non-cash items:** | | | |
| Depreciation and amortisation expense | **5/6** | 6,926 | 7,061 |
| Depreciation on right-of-use assets | **7** | 410 | 506 |
| Gain on modification of lease contracts | **7** | - | (110) |
| (Decrease)/increase in allowance for expected credit losses | **9** | (42) | 4 |
| Decrease/(increase) in deferred tax asset | **13** | 234 | (1,563) |
| Fair value (gain)/loss on derivative financial instruments | | (43) | 24 |
| Other non-cash items | | 1 | (5) |
| | | **7,486** | **5,917** |
| **Changes in working capital:** | | | |
| Decrease in trade and other receivables and contract assets | | (2,222) | (2,417) |
| Decrease in inventories | | (25) | (161) |
| Increase in trade and other payables and contract liabilities | | 412 | 5,480 |
| Increase in Government grants received in advance | | 10,942 | - |
| (Decrease)/increase in income tax payable | | (2,013) | 54 |
| Increase in employment benefits | | 677 | 809 |
| | | **7,771** | **3,765** |
| **Items classified as investing and financing activities:** | | | |
| Loss on disposal of property, plant and equipment | | 39 | 6 |
| Decrease in trade payables related to property, plant and equipment | | (44) | (790) |
| Finance charge on leases | | 148 | 138 |
| | | **143** | **(646)** |
| **Net cash inflow from operating activities** | | **15,484** | **9,531** |

## 16. Investments

### *Subsidiaries*

The consolidated financial statements incorporate the assets and liabilities of all subsidiaries of ESR as at 30 June 2023 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Property, plant and equipment | 1,077 | 3,354 |
| Intangible assets – software | 163 | 41 |
| **Total capital commitments** | **1,240** | **3,395** |

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.

## 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 2023 revenue from commercial transactions with Crown entities amounted to 82% of operating revenue (30 June 2022: 72%).

Related parties include the entities disclosed in note 16.

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

- Personnel and equipment were supplied to STRmix Limited to the value of $5,016,000 (30 June 2022: $3,710,000). As at balance date STRmix Limited owed ESR $620,093 (30 June 2022: $269,129).
- Fees paid to directors during the year were $183,740 (30 June 2022: $191,739). Directors' fees payable was nil at balance date (30 June 2022: $4,005).
- During the 2023 financial year, ESR purchased services of $42,900 (2022: $47,300) 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 | 2023 $'000s | 2022 $'000s |
|---|---|---|
| Salaries and other short-term employee benefits | 3,030 | 2,813 |
| Directors' fees | 184 | 192 |
| **Total key management personnel compensation** | **3,214** | **3,005** |

## 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.

### *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 the statement of profit or loss and other comprehensive income. 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 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 $000's | Total $'000s |
|---|---|---|---|---|
| Liabilities as per balance sheet | | | | |
| Employee benefits | | 9,267 | - | 9,267 |
| Trade payables and accrued expenses | **10** | 13,090 | - | 13,090 |
| Lease liability | **7** | 3,659 | - | 3,659 |
| **Total** | | **26,016** | **-** | **26,016** |

| Group | Note | Financial assets at amortised cost $'000s | Financial assets at fair value through profit or loss $'000s | Total $'000s |
|---|---|---|---|---|
| **30 June 2022** | | | | |
| Assets as per balance sheet | | | | |
| Trade and other receivables excluding prepayments | **9** | 7,876 | - | 7,876 |
| Cash and cash equivalents | | 2,037 | - | 2,037 |
| Investment cash | | 39,023 | - | 39,023 |
| **Total** | | **48,936** | **-** | **48,936** |

| | | Financial liabilities at amortised cost $'000s | Financial liabilities at fair value through profit or loss $000's | Total $'000s |
|---|---|---|---|---|
| **Liabilities as per balance sheet** | | | | |
| Employee benefits | | 8,590 | - | 8,590 |
| Trade payables, accrued expenses | **10** | 13,102 | - | 13,102 |
| Lease liability | **7** | 3,883 | - | 3,883 |
| Derivative financial instruments | | - | 15 | 15 |
| **Total** | | **25,575** | **15** | **25,590** |

## 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 2023 ESR held six (30 June 2022: six) forward exchange contracts with notional principal amounts totalling $5,371,000 (US$3,250,000) (30 June 2022: $4,737,000 (US$2,948,000)). 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:

| | 2023 $'000s | 2022 $'000s |
|---|---|---|
| US dollar | 1,993 | 1,729 |
| Australian dollar | 267 | 21 |
| Euro | 20 | 68 |
| Pound sterling | 1 | - |
| Singapore dollar | 20 | - |

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

| | 2023 $'000s | 2022 $'000s |
|---|---|---|
| US dollar | 431 | 481 |
| Australian dollar | 118 | 70 |
| Pound sterling | 19 | 1 |
| Swiss Franc | - | 2 |

### *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 short-term deposit investment accounts to hold excess funds. Available interest rates ae monitored to ensure the best return on cash.

### *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% (depreciation of New Zealand dollar) and +10% (appreciation of New Zealand dollar) against foreign currencies
- A parallel shift of +2%/-2% 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 2023 would be:

- Foreign currency $317,000 (30 June 2022: $135,000)
- Interest rates $501,000 (30 June 2022: $552,000).

## *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 2023 (30 June 2022: 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 2023, the trade receivables balance included $3,695,982 (30 June 2022: $3,250,672) 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 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** |

| Group 2022 | 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 | 13,102 | 13,102 | - | - | - |
| Employee benefits | 8,590 | 5,674 | 1,031 | 64 | 1,821 |
| Lease Liabilities | 5,754 | 501 | 535 | 1,462 | 3,256 |
| | **27,446** | **19,277** | **1,566** | **1,526** | **5,077** |

The total contractual cash flows of lease liabilities for 30 June 2022 has increased by $1,871,000 from $3,883,000 as previously stated to $5,754,000. The maturity profiles as previously stated for less than 1 year, 1–2 years, 2–5 years and greater than 5 years have increased from $344,000 to $501,000, $358,000 to $535,000, $354,000 to $1,462,000 and $2,827,000 to $3,256,000 respectively. This change was made to correctly include lease liabilities as undiscounted rather than discounted in this disclosure.

### *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 significant 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 shareholder, 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 2023 and 30 June 2022 were as follows, along with the relevant annual targets set by ESR.

| Group<br>Return on equity ratio | 2023<br>$'000s | 2022<br>$'000s |
|---|---|---|
| Profit for the year | 84 | 495 |
| Average equity | 60,664 | 60,375 |
| **Actual ratio** | **0.16%** | **0.8%** |
| **Target ratio** | **3.5%** | **(4.3%)** |
| Gearing ratio | | |
| Net debt | | |
| Lease liabilities – current | 400 | 344 |
| Lease liabilities – non-current | 3,259 | 3,539 |
| | **3,659** | **3,883** |
| **Equity** | **60,706** | **60,622** |
| **Actual ratio** | **5.7%** | **6.0%** |
| **Target ratio** | **5.0%** | **3.7%** |

## 21. Contingent liabilities

There are no contingent liabilities as at 30 June 2023 (30 June 2022: nil).

## 22. Subsequent events

There were no other events subsequent at reporting date that require disclosure in the financial statements (30 June 2022: nil).

# 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 2023.

**Professor Sarah Young**
Chair

**Kate Thomson**
Risk and Assurance Chair

Science New Zealand

# SCIENCE WORKING FOR AOTEAROA NEW ZEALAND

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

agresearch
*āta mātai, mātai whetū*

ESR
Science for Communities
He Pūtaiao, He Tāngata

GNS SCIENCE
TE PŪ AO

Manaaki Whenua
Landcare Research

NIWA
Taihoro Nukurangi

Plant & Food™ Research
Rangahau Ahumāra Kai

SCION™
FORESTS ▪ PRODUCTS ▪ INNOVATION

**4,400**
SMART AND PASSIONATE PEOPLE

**54**
SITES ACROSS AOTEAROA NEW ZEALAND

**6,000**
SCIENCE PROJECTS EACH YEAR

**40**
NATIONALLY SIGNIFICANT DATABASES & COLLECTIONS

WWW.SCIENCENEWZEALAND.ORG

www.esr.cri.nz

**ESR has science facilities in Auckland, Wellington (Porirua and Wallaceville) and Christchurch.**

***Mt Albert Science Centre***

120 Mount Albert Road, Sandringham, Auckland 1025
Private Bag 92021, Auckland 1142, New Zealand

***Registered office: Kenepuru Science Centre***

34 Kenepuru Drive, Porirua 5022
PO Box 50348, Porirua 5240

**T** +64 4 914 0700

***Wallaceville Science Centre***

66 Ward Street, Wallaceville,
Upper Hutt 5018
PO Box 40158, Upper Hutt 5140,
New Zealand

***Christchurch Science Centre***

27 Creyke Road, Ilam, Christchurch 8041
PO Box 29181, Christchurch 8540, New Zealand

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