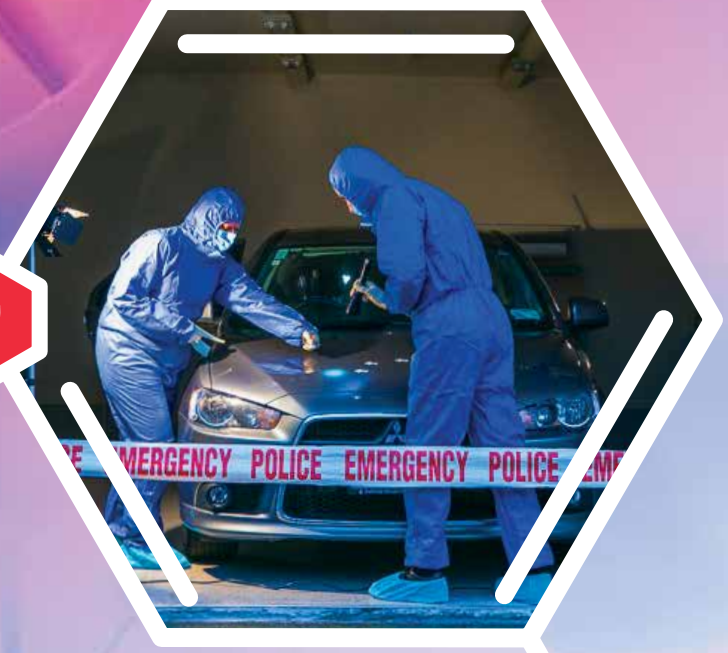
SCIENCE FOR COMMUNITIES

HEALTHIER COMMUNITIES



SAFER COMMUNITIES

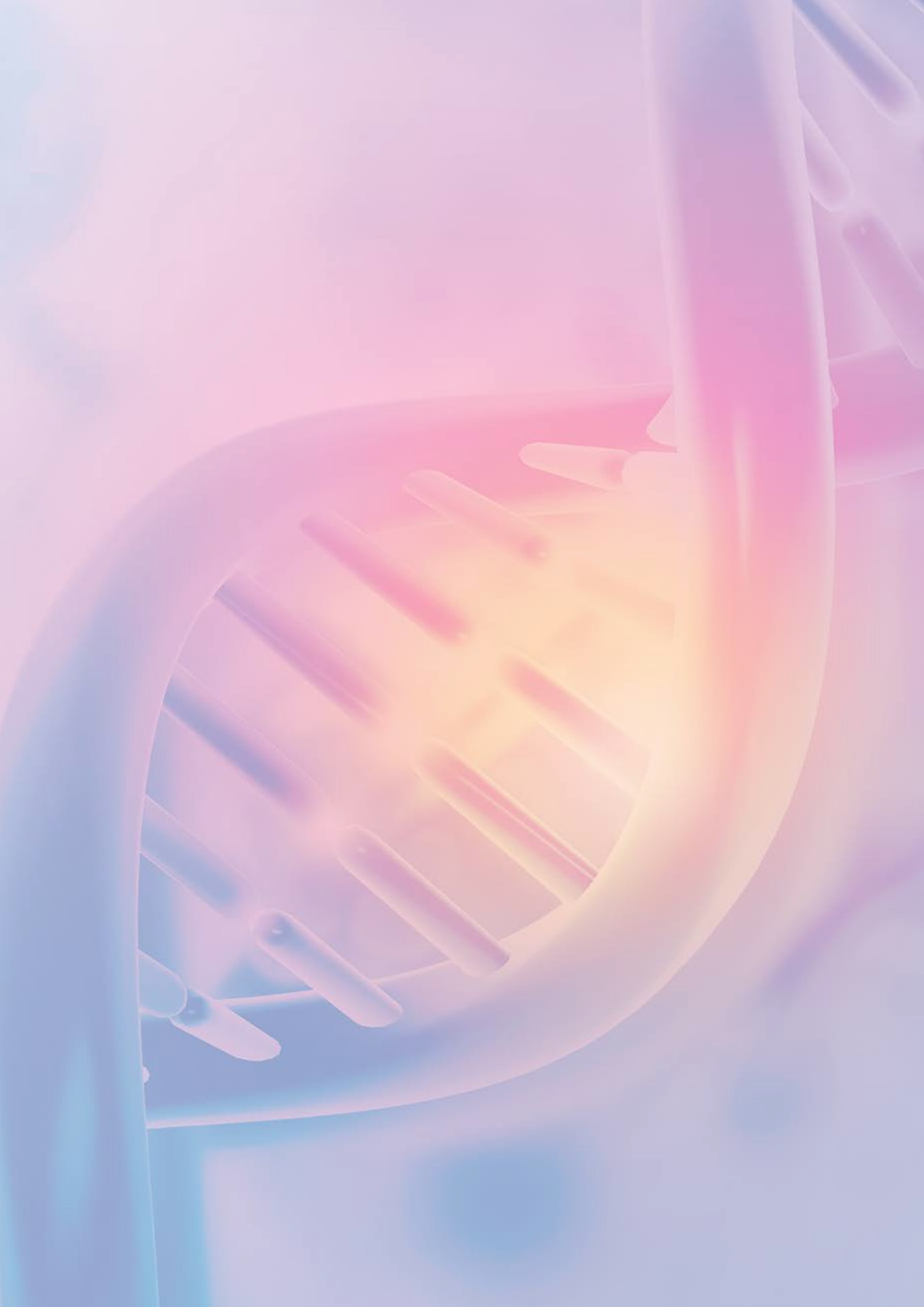
A CLEANER ENVIRONMENT

ESR Science for Communities

PRIME MINISTER'S SCIENCE PRIZE WINNER 2018

STATEMENT OF CORPORATE INTENT

2019-2024



Contents

Presented to the House of Representatives pursuant to section 44 of the Public Finance Act 1989.
The Institute of Environmental Science and Research Limited (ESR) is a Crown research institute.
It was incorporated in June 1992 and is wholly owned by the New Zealand Government. The two shareholding Ministers appoint a Board of Directors to govern the organisation. ESR has science facilities in Auckland, Wellington (Porirua and Wallaceville) and Christchurch.
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Executive summary

We are pleased to present ESR's 2019–2024 Statement of Corporate Intent (SCI). This document examines our operating environment, our strategy and the science activities we will undertake to improve the wellbeing of New Zealanders.

ESR plays a critical role in improving the wellbeing of New Zealanders.

We use our world-leading science to address complex challenges facing our communities. Disease outbreaks, antimicrobial resistance, the proliferation of synthetic cannabinoids, violent crime, and increasing threats to the environment and waterways are just some of the challenges we face.

This is a broad mandate. And it is a vital one.

ESR adapts international developments in science to the New Zealand context to improve health, justice, and environmental outcomes for New Zealanders. Whole genome sequencing is already enabling ESR to better monitor and reduce the impact of infectious diseases prevalent in New Zealand. Our analysis of drugs in wastewater is providing Police and other agencies with valuable intelligence on the consumption of illicit drugs regionally.

Advances in science and technology are evolving at an increasing pace, providing ESR with even greater opportunities to improve the wellbeing of our people and the communities in which they live. We have undertaken a lot of work investigating how we develop new research and the capability to expand our contribution to government's wellbeing priorities.

Specific areas where we are already making a real difference are groundwater nitrate mitigation, understanding the environmental impact of micro-plastics, influenza surveillance and commercialisation of forensic technologies. ESR can provide further research in the areas that will make a difference and significantly improve our nation's wellbeing:

- developing innovative methods to treat nitrogen run-off from farms
- researching ways to reduce the impact of antibiotic resistant superbugs in New Zealand
- gaining access to a wealth of real-time population-level intelligence on the health of our New Zealand communities through wastewater testing
- hosting a New Zealand human genome database for medical research
- examining how the impact of climate change will affect human health in New Zealand.

We are implementing an ambitious transformation programme to position ESR for future success. This aims to deliver an even greater impact for New Zealanders.

The first part of this transformation programme is Transforming our science. We will capitalise on evolving trends in science and technology through investing in the right capability and research to improve health, justice and environmental outcomes. One of the powerful solutions already developed by ESR is the world leading forensic software STRmix™. The software is used by forensic laboratories around the world and recently won the Prime Minister's Science Award.

The second pillar of our transformation is Making it happen, together. We will invest in our people and lead them through the changes ahead. Leaders at all levels will reinforce a workplace culture to deliver high performance, innovation, agility and collaboration. Adopting new ways of working is essential to refresh ESR and achieve our transformation.

Growing ESR so we can reinvest in our science is the third part of our transformation. Growth opportunities from our award-winning forensic software STRmix™ will be investigated, and the proceeds reinvested back into further developing our science. We will expand our range of science products and services to be relevant to new clients. We will generate more sustainable margins on our core contracts by reducing the cost of service delivery and engaging with our clients over the increased value we can provide them.

While our transformation will position ESR for future success, there are several challenges in our operating environment we will need to manage. Our research capability is critical to the impact we make for New Zealanders. However, we are finding it challenging to maintain the critical mass of research we need with the level of Strategic Science Investment Funding available.

Another major challenge is the sustainability of science contracts with government agencies, which are operating under tight fiscal constraints. We will continue to drive efficiencies but if funding levels remain capped, we will not be able to sustain and grow the science capabilities that underpin future solutions.

We are determined to tackle these challenges and we see a bright future for ESR and its contribution to the wellbeing of future generations of New Zealanders.

Denise Church QSO

Chair

Our purpose

ESR is a Crown Research Institute (CRI) entrusted with using the power of science to tackle critical challenges facing New Zealand in the areas of public health, crime, food safety and water quality.

Our point of difference is that our science services and research are focused on keeping communities safe and healthy, which is essential for the wellbeing of all New Zealanders.

ESR's high calibre teams provide independent, authoritative and trusted science solutions. We are particularly recognised for our advanced science capabilities in microbiology, DNA and our ability to solve complex problems.

We maintain nationally critical science capabilities that are used when responding to matters of national significance such as food contamination threats and major disease outbreaks. ESR's science capabilities include health science, forensic science, food and water science, radiation science, social systems and workplace drug testing. Our deep expertise in these important fields is what sets us apart.

Statement of Core Purpose

ESR's Statement of Core Purpose sets out our mandate from shareholding Ministers:

"...deliver enhanced scientific and research services to the public health, food safety, security and justice systems, and the environmental sector to improve the safety of, and contribute to the economic, environmental and social well-being of people and communities in New Zealand

ESR provides research and scientific services and knowledge transfer in partnership with key stakeholders including government, industry and Māori to:

- Safeguard the health of New Zealanders through improvements in the management of biosecurity and threats to public health
- Increase the effectiveness of forensic science services applied to safety, security and justice investigations and processes
- Enhance protection of New Zealand's food based economy through the management of food safety risks associated with traded goods
- Improve the safety of freshwater and groundwater resources for human use and the safer use of biowastes."

Strategy

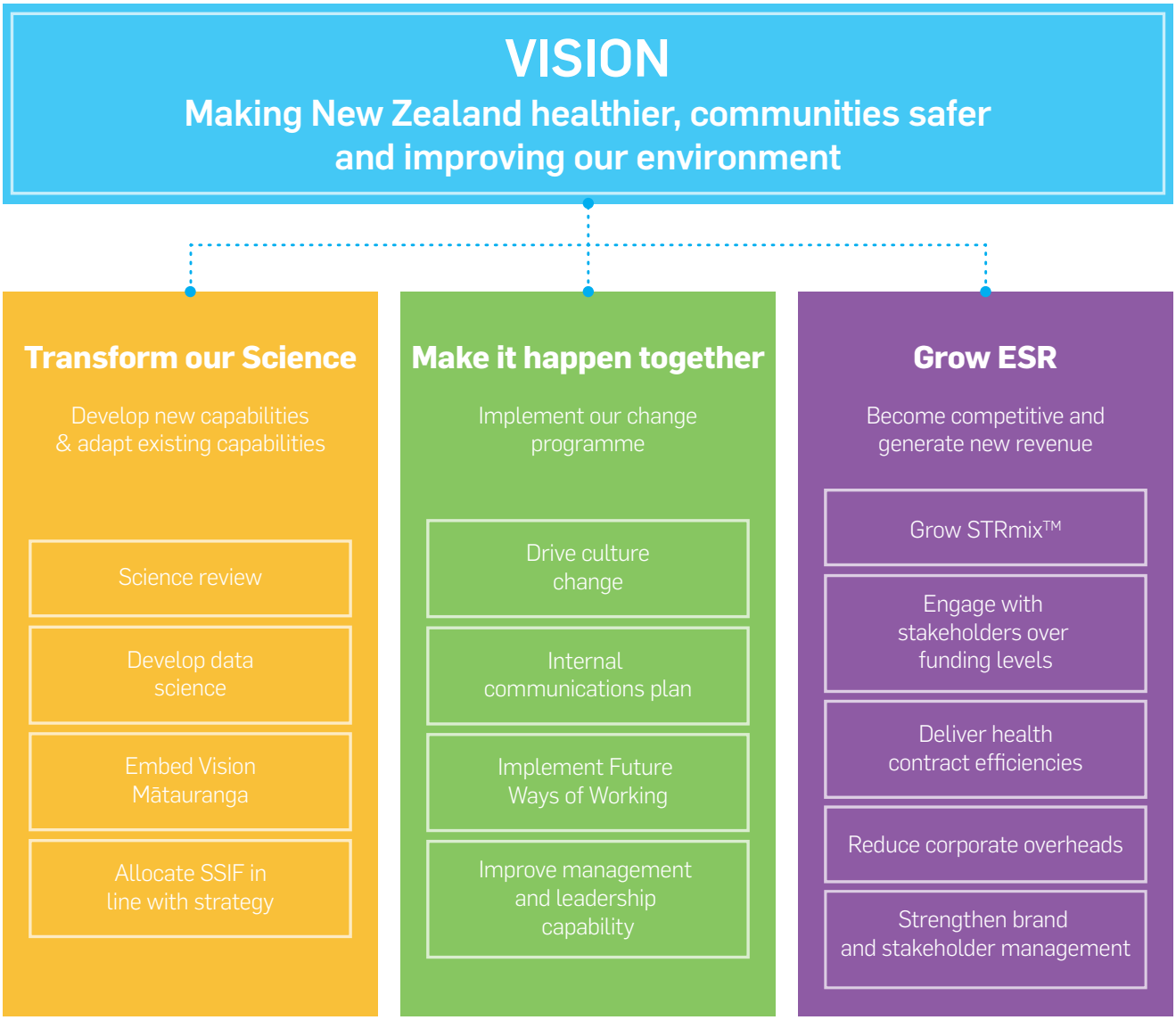
Our aim is to deliver significant improvements to the wellbeing of New Zealanders. We will achieve this by adopting new developments in science and technology, implementing our change programme, and growing ESR to become financially sustainable.

We are embarking on an ambitious transformation programme to refresh all aspects of our business and position ESR for future success.

All of the actions we take are shaped by our vision:

Making New Zealand healthier, communities safer, and improving our environment.

Our goals are to transform our science, work together to make transformation happen, and grow ESR so we can reinvest in our science and continue to improve community wellbeing.



Transforming our science

Rapid advances in science and technology are evolving at an increasing pace. This provides ESR with even greater opportunities to improve the wellbeing of our people and communities in which they live. We have undertaken a lot of work looking at how we develop new research and capability to expand our contribution to government's wellbeing priorities. By Transforming our Science, we will develop new and existing capabilities, ensuring ESR continues positively impact on keeping New Zealanders safe and healthy.

Science Review

Understanding these trends and preparing the organisation to respond to them is essential to our long term sustainability. Our Future Trends Working Group has identified the major trends in science and technology and examined the impact this will have on our business. Whole genome sequencing is already providing much richer genetic information on infectious diseases, and will drive a shift for ESR from wet labs to dry labs. Other trends in science include metagenomic testing, which analyses all genetic material in a sample, remote monitoring using networked sensors, and the growth of data science. ESR will adopt shifts in technology which include artificial intelligence and machine learning, increased automation, development of miniaturised portable DNA equipment, big data and data analytics. We will continue to review trends in technology and science, ensuring we have the right capabilities to meet our clients' needs.

Generating deeper insights through data science

A key part of our transformation is our significant and continued investment in data science. The explosion of data and the ability to build relationships between disparate data sources is providing us with greater opportunities and providing deeper insights to inform decision making and government policy. We are using data science to unlock the power of our existing data assets, for both operational and science gains. By building on our core data to generate new intelligence, we will create new value to serve the wellbeing of New Zealand communities.

We will progressively enhance both our cloud and on premise data platforms. Moreover, we will equip staff with the relevant tools, skills and relationships to become a leading provider of human data expertise to the New Zealand public sector in the health, justice, environment and education areas. Starting in the health domain, we will extend our public health surveillance service with new externally sourced data and enrich our existing data with genomic reference data. Democratised data sources will increasingly add value to our own data sets, enhancing our capability to appropriately and securely capture, manage and integrate new data sources.

Increasing our commitment to Vision Mātauranga

ESR will partner with Māori to identify areas of mutual interest, growth and co-innovation to authentically support Māori, leveraging science as a key ingredient to ongoing social, cultural and economic development. We will strengthen our relationships with Māori, iwi, hapu, businesses, Māori territorial authorities, government agencies, industry and Māori research partners. In 2019/20 we will, deliver MBIE-funded Vision Mātauranga projects, bid for new research and employ two Māori scientists. We will continue to lift our capability to engage and partner with Māori by establishing internal infrastructure and initiatives to support our Vision Mātauranga objectives:

Engage	Promote	Facilitate	Coordinate	Invest
Engage with Māori to understand the challenges of primary concern and identify opportunities for co-innovation	Promote the utilisation of ESR's existing science based solutions and technologies, and support the development of new technologies, information and research to add value to Māori assets	Facilitate internal organisational collaboration, as well as external organisational relationships to maximise opportunities to partner and collaborate on work in key areas of interest to Māori	Coordinate Māori engagement across ESR	Invest and allocate internal resources to develop meaningful relationships with Māori partners

Investing SSIF for best effect

Research underpins ESR's future products and services, and its long-term financial sustainability. We have a strong track record of commercialising innovative science products such as our award-winning forensic software STRmix™. Research also enables ESR to respond rapidly to critical events affecting New Zealand. In recent years ESR leveraged its past research to support sophisticated investigations into the Havelock North Campylobacter outbreak and the 1080 milk powder contamination threat.

Areas where ESR could and should undertake bolder and more innovative research for New Zealanders include:

Improving water quality

ESR is developing innovative treatment methods for nitrogen run-off from farms, including a woodchip-based denitrification wall that could rapidly improve the quality of New Zealand's groundwater. The speed with which we do this is only limited by lack of resources. Additional SSIF funding would assist us in speeding up the process.

Antimicrobial resistance - one of the top 10 threats to wellbeing globally

ESR has the necessary skills to undertake research into antimicrobial resistance. This is fundamental to reduce the impact on hospital patients and extend the effective life of antibiotics in New Zealand. There are huge benefits to this work but limited funding slows the progress of its development. The ability of bacteria, parasites, viruses and fungi to resist antibiotics threatens to send us back to a time when we were unable to treat infections such as pneumonia, tuberculosis, gonorrhoea, and salmonellosis easily. The World Health Organisation has identified antimicrobial resistance as one of the top 10 threats to global health.

Understanding the effect of climate change on human health

The effect of climate change on the physical world is well-recognised (melting ice, rising seas, etc) but the impact on human wellbeing is not well understood. Increasing temperatures will have an impact on the presence and growth rates of the organisms that cause human disease. Changing temperatures will also affect the prevalence and spread of disease. ESR believes it is urgent to undertake further research into the impact of climate change on New Zealanders, to help guide policy and protect human health in the near future.

Wastewater epidemiology – accessing real time intelligence on health risks to New Zealanders

Our work on identifying illicit drugs in wastewater has informed our understanding of threats to health in specific communities and has informed the consequent response and prevention activities of government agencies. There is enormous potential in expanding wastewater-based epidemiology to act as a 'community canary' for health risks in our communities.

Genomic database for personalised medicine

Whole genome sequencing is providing an increasingly effective means for identifying an individual's health risks, enabling health professionals to manage those risks better. ESR aims to work with District Health Boards, the Ministry of Health and universities, to examine the feasibility of providing genomic testing and developing a human genome database for the purposes of personalised medicine. Whole genome sequencing can also identify whether specific medications will be effective for an individual, based on the presence or absence of specific biomarkers. 'Personalised medicine' will ensure patients are prescribed more effective medication that will work best for them.

ESR is already well placed to undertake research into the areas outlined above, and could provide a much greater contribution to the wellbeing of New Zealanders with an increased scale of SSIF investment.

Making it happen together

Embedding a high performing culture

Organisational culture continues to be a major driver of performance for ESR. We will continue to provide a workplace culture that delivers high performance, innovation, agility and collaboration, based on trust and empowerment. We will provide increased recognition for our high performing teams and staff. Internal communications around the need for change will increase as we embed this new culture across the organisation.

Future ways of working

Adopting new ways of working will drive innovation and prepare our people for the future workplace. We will use technology to streamline our processes and better connect our staff across our different locations. Continuous improvement will be part of our culture. , We will remove change barriers, providing all staff with a 'licence to act', and improve ESR's change readiness

We will support our people by providing workplace settings matched to the activities performed. The physical workplaces will be complemented with technology to support our people wherever they work -at a client site, in the field, from home, or internationally.

We will ensure our science facilities encourage collaboration and innovation, are flexible enough to meet our future needs, and are more financially and operationally resilient. Our first priority is a commitment to invest in a fit-for-purpose science facility in the Wellington region, replacing the ageing Kenepuru Science Centre in 2022/23.

Developing our people

Our people are our greatest asset. We will continue to invest in the capability of our managers and leaders, equipping them to build the capability of their teams, facilitate growth and innovation, and lead our staff through the changes ahead. We are developing a learning and development programme to provide all staff with the knowledge and skills needed for the future. This includes an increased commitment to managing health and safety risks, keeping all staff and contractors safe in the workplace.

Growing ESR

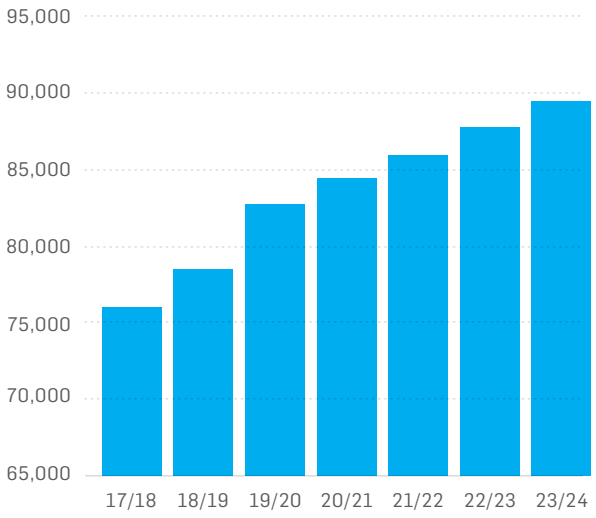
Diversifying ESR's revenue base is core to our plan for long-term financial sustainability. We have already successfully turned our research into commercial success, with our world-leading forensic software STRmix™. Revenue from STRmix™ is expected to grow further in the years ahead, as we execute new market entry strategies and expand uptake of the software in new markets. We will expand our range of products and services and strengthen our internal infrastructure to better support commercialisation. We will continue to invest an increased amount in ESR's Pioneer Fund, providing stage-gated funding for innovative research.

ESR is committed to developing new products and services to deliver greater value for our clients and New Zealanders. We are also driving internal efficiencies, reducing the cost of service delivery. For example, we are currently reviewing potential efficiencies from using epidemiological statistical approaches to inform the number of samples and tests required. However, if funding remains capped and we cannot achieve a sustainable margin on our services, then our ability to innovate will be constrained and we will need to look at reducing services and capability. This would potentially compromise our future ability to respond to critical events such as drinking water contamination, major disease outbreaks, and ecoterrorism events.

ESR is known for its work in forensic science, but we are less well recognised for the impact we make in public health and environmental science. We will grow our brand, profile and visibility to ensure we are front of mind for our core clients and potential new clients, and collaborators and media.

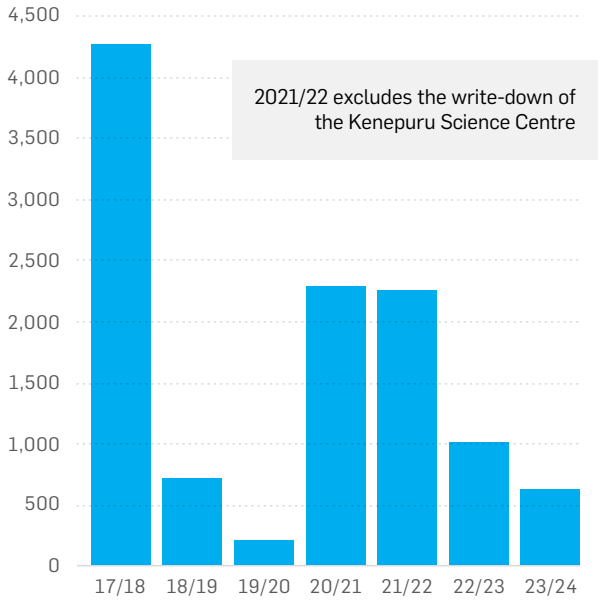
The financial results in 2021/22 will include a one-off $5.1m write-down of the Kenepuru Science Centre. The NPAT for 2021/22 including this write-down will be a $1.5m loss. The Net Profit After Tax (NPAT) figures in this SCI are lower than our previous SCI due to the investment required to transform our science and replace our science facilities ($4.7m per annum).

Total Revenue ($000s)



The key driver of future revenue growth is our innovative forensic software.

Net Profit After Tax ($000s)



2021/22 excludes the write-down of the Kenepuru Science Centre

ESR's Net Profit After Tax will reduce in future years due to reinvestment in transformation of our science and investment in science facilities.

Our impacts and performance

Our scientists provide trusted independent evidence, intelligence, insights and advice that informs the decisions and actions of local authorities, government agencies and industry.

Our science makes a real difference to the wellbeing of New Zealanders by reducing spread of infectious diseases, reducing harm from illicit drugs, solving serious crimes, ensuring food is safe to eat, and making freshwater and drinking water cleaner.

Our science is used to inform clients' decisions and actions. We provide independent scientific advice which influences the management of disease outbreaks, criminal investigations and initiatives to reduce contamination of waterways. Many of the science solutions we provide are multi-disciplinary, spanning different science domains.

INPUTS

Funding, including government funding (Crown and contestable science funding) and commercial revenue

- Science capability, methods, expertise and institutional knowledge
- Wider body of scientific know-ledge and the stock of intellectual property
- Relationships with clients and collaborators, and an understanding of their systems and context
- Science equipment, IT and property

ACTIVITIES

Research related to people and communities (including health, food, water and forensic science)

- Laboratory and field research, and data science. Maintaining key national data and sample collections.
- Providing meaning to scientific analysis. Delivering intelligence to the right people at the right time, and in the right form.
- Continuous innovation and evolution of ESR's science services to meet the future needs of clients and New Zealand.

Maintaining the capability and capacity to provide scientific advice in response to events (including forensic scene attendance and public health and environment emergencies).

Developing new products, services, science capabilities, and our own people.

Reinvested profits

OUTPUTS

- Science services (client reports, scientific advice, lab results, disease surveillance)
- Research outputs (journal articles, conference presentation and participation, research collaboration)
- Commercialisation of new products, services and intellectual property

Thought leadership into the evolving nature of the science related to people and communities

ESR strategically maintains a high-quality and agile workforce and builds strategic partnerships with clients and science collaborators

Decisions and actions are informed by trusted independent science, insights and advice

ESR achieves its research and science objectives, and sustainable financial returns

SHORT-TERM OUTCOMES

- ESR's advice improves NZ's ability to respond to disease outbreaks
- ESR's advice reduces the risk of disease outbreaks from overseas
- NZ's health system becomes more proactive

- ESR's advice on drug surveillance reduces the flow of drugs across NZ's border
- ESR's analysis of DNA and physical evidence, and expert testimony results in crimes being solved faster
- NZ Police is well-supported through ESR's forensic science expertise (nationwide and around the clock)
- ESR contributes to accurate prosecutions

- ESR's biological, chemical and radiation testing and advice opens key international markets to NZ food exports
- ESR's services and advice are effective tools to help New Zealand's food industry manage biological and chemical food safety risks

- ESR's research and advice on water contributes to reduced water contamination and water quality issues
- ESR works with stakeholders to improve freshwater policy and drinking water standards

ESR consistently meets (or exceeds) the Crown's scientific and financial performance expectations

MEDIUM-TERM OUTCOMES

- Spread of infectious diseases is reduced
- Communities are protected from harmful contaminants
- NZ's response to disease outbreaks is effective and efficient
- ESR's advice influences health and environment policies and regulations

- NZ's criminal justice system becomes more effective and efficient
- Reoffending is reduced
- Harm caused by illicit drugs is reduced
- New Zealanders have confidence in the criminal justice system

- Food exported from NZ remains safe
- Food consumed in NZ remains safe
- New Zealand's food industry is able to demonstrate 'Food Integrity' (including authenticity and safety)

- The quality and safety of NZ's drinking water improves
- Rivers, streams and ground water are less contaminated
- Sustainable use of biowaste is improved
- ESR's advice influences water policies and regulations

IMPACTS

- **Healthier Communities**
- **Safer Communities**
- **Safer Food**
- **Cleaner Water**

ESR's work contributes to a safe, healthy and prosperous New Zealand, and improves the wellbeing of New Zealanders

To assess our performance we measure the contribution we make to our four outcomes: healthier communities, safer communities, safer food, and cleaner water and environment. The measures below are under development and will continue to be refined.

The outcome measures set out below reflect the difference we make by informing our clients' critical decisions and actions. The measures for healthier communities and safer communities focus on the science services we provide for Ministry of Health and Police. The measures for safer food and cleaner water and environment reflect the research and advice we provide to the Ministry for Primary Industries and local authorities.

	Outcome measures	What the outcome measures indicate	Output delivery measures
HEALTHIER COMMUNITIES	• ESR provides effective support for outbreak responses (Ministry of Health's satisfaction is 'good' or higher) • Disease surveillance information is distributed to all key decision makers • Impact case studies	• Ministry of Health's satisfaction with disease outbreak responses is an indicator of the value of ESR's science and advice to the management of outbreaks • Distribution of surveillance information to key decision makers is critical for limiting the spread of infectious diseases	• 100% of time-critical turnaround times are met • Ministry of Health satisfaction with ESR services rates as 'Good' or better • >95% of Ministry of Health's project brief milestones and deliverables are consistently met
SAFER COMMUNITIES	• Percentage of DNA samples linked to a person (target 70%) • Total number of cases where ESR provides Police with forensic evidence analysis • Percentage of homicide and sexual assault investigations finalised within 12 months • Number of research projects undertaken by ESR for the Evidence Based Policing Centre • Impact case studies	• DNA and physical evidence provides critical information for criminal investigations • Evidence Based Policing research informs Police tactics and decision making, enhancing policing and directing police resources to where they are needed most	• 90% fulfilment of contractual obligations under the service level agreement • 90% Police satisfaction with ESR's timeliness and quality of service • Police trust and confidence measures
SAFER FOOD	• Impact case studies	• Impact case studies in our Annual Report provide qualitative information on cases where ESR has improved food safety	• Number of projects delivered for the NZ Food Safety Science Research Centre
CLEANER WATER AND ENVIRONMENT	• Percentage of New Zealanders with access to drinking water that meets the national standards • Number of territorial local authorities and interest groups we provide water quality advice to • Impact case studies	• When ESR's research is accepted for publication and cited by other researchers it indicates innovative approaches and/or important findings were made • The number of local authorities that ESR provides advice to is an indicator of the nationwide impact our water science on initiatives to clean up waterways	• Annual Drinking Water report delivered on time • Number of publications of our water and environment research

The science activities we undertake to deliver on these four outcomes are set out in the next four sections of the SCI.

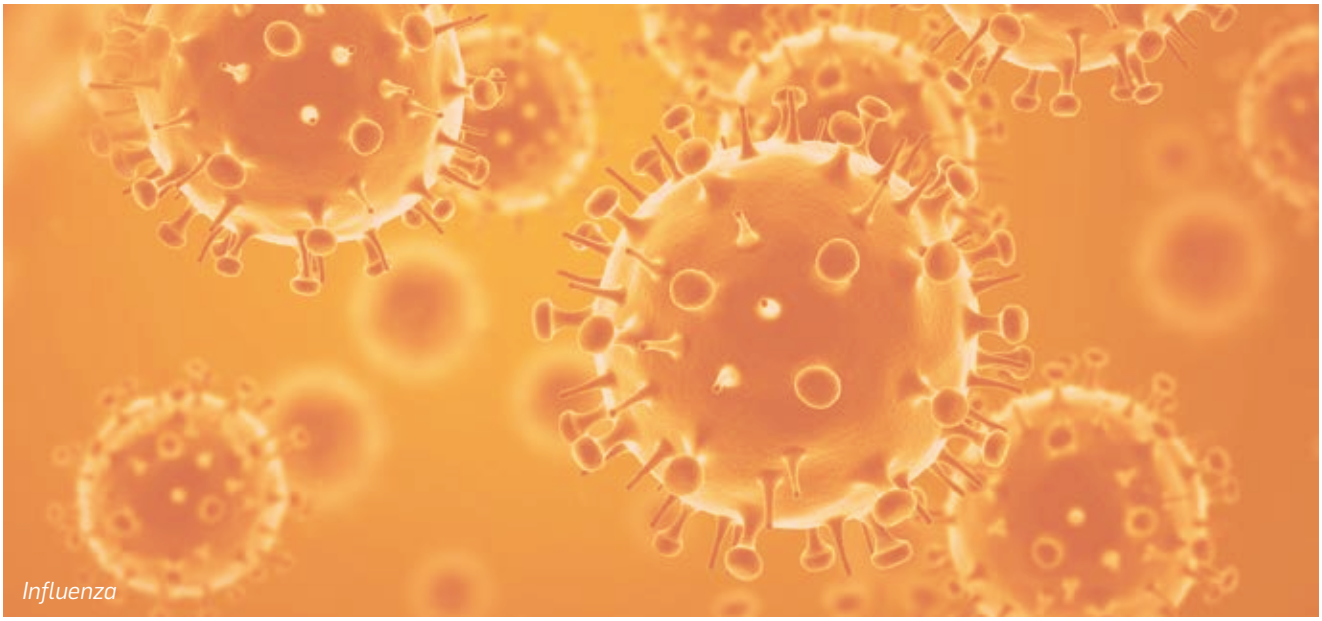
We are developing a stakeholder engagement framework to underpin our relationships with partners, influencers and clients and leverage these relationships to make a difference to New Zealanders. We will continue to bring our major stakeholders together every six months to gain a deeper understanding of their strategic priorities. We will conduct a formal stakeholder survey every two years to understand how well we are responding to their needs.

We also monitor our performance against the following generic measures used by all CRIs.

Key result area	Measure	2018/19 Forecast	2019/20 Target
Research collaboration	Publications with collaborators	63	65
Technology and knowledge transfer	Commercial reports per scientist FTE	0.25	0.30
Science quality	Impact of scientific publications (measured using Web of Science citations for the previous calendar year)	3.3	3.5
End user collaboration	Revenue per FTE from commercial sources	$153,000	$153,000
Financial indicators	Revenue per FTE	$193,000	$191,000
	Commercial revenue	$62.3m	$66.3m

Healthier communities

Safeguard the health of New Zealanders through improvements in the management of human biosecurity and threats to public health.



Influenza

Health Science Vision

ESR will ensure New Zealand's scientific and clinical response capability, with regard to human health, remains effective, on par with international standards and is enhanced to take account of new and emerging public health threats. Insights and solutions will be provided to counter the spread of antimicrobial resistance, informing public health policy and response measures.

Impacts

Early detection of public health threats and implementation of effective interventions are critical to ensure their appropriate management. Our work provides early detection and supports the implementation of interventions, therefore reducing the harm and cost of public health threats.

Our laboratory expertise and extensive health surveillance and intelligence networks allow us to rapidly identify and alert health authorities to public health threats and assess the effectiveness of interventions.

Using a diverse range of data and information sources, including our reference laboratory, our National Notifiable Diseases Surveillance System, laboratory notifications and outputs from our early warning systems, our scientists and clinicians provide intelligence products across the New Zealand health sector and to international health agencies. These products provide intelligence on significant public health threats such as influenza, antimicrobial resistance, gastroenteritis and vaccine preventable diseases.

Our experts provide advice, support and recommendations across the New Zealand health sector, including the Ministry of Health, public health units (PHUs) district health boards (DHBs) and primary care to support national, local and regional public health policies and interventions.

Our work is focused on the following impacts:

- Reducing the burden of infectious diseases and other health threats
- Improving our readiness and response to public health threats
- Improving human biosecurity
- Mitigating risks to human health from radiation
- Improving the safety of medicines
- Improving the understanding of complex and challenging public and environmental health issues.

Activities

To achieve these impacts our scientists:

- Provide national intelligence, including early warning systems and international monitoring, for current and new and emerging public health threats.
- Operate as a support agency to the Ministry of Health within the National Security System.
- Operate and manage New Zealand's National Disease Surveillance System (including notifiable disease and other emerging health threats such as antimicrobial resistance)
- Coordinate national and regional outbreak investigations and responses on behalf of the Ministry of Health and local public health authorities
- Provide accredited reference laboratory services
- Conduct microbial identification and characterisation, including genomic analysis
- Undertake readiness activities to ensure capability and capacity to respond to health threats
- Test the safety of medicines and other therapeutic products against international quality and safety standards, including testing to identify counterfeit and adulterated medicines
- Provide scientific advice and services to the Ministry of Health's Office of Radiation Safety
- Operate monitoring stations that measure radiation levels as part of the Comprehensive Nuclear-Test-BanTreaty Organization (CTBTO)
- Monitor the National Data Centre for nuclear and radiation monitoring on behalf of the Ministry of Foreign Affairs and Trade
- Provide radiation testing, advice, training, calibration, regulatory support and dosimetry services.
- We provide public health science services to central government under contracts with key government health and biosecurity agencies. Through these contracts we deliver core health science services at local and community levels to DHBs, public health services and local government. Our partnerships are centred on the DHB-based public health units, university collaborators, research partners in primary care, the Health Research Council and the United States Centers for Disease Control and Prevention. In the future we will strengthen and broaden our partnerships with DHBs, the primary care sector and provider partners
- Assist decision-makers to address challenging problems that involve high levels of complexity and uncertainty.

Planned initiatives

To improve public health outcomes we will:

- Implement new technologies for the detection and characterisation of microorganisms, including new, re-emerging, and rare infectious agents
- Enhance and extend our bioinformatics capabilities relating to microbial pathogens including outbreak investigation, antimicrobial resistance and population analysis
- Enhance and extend our health informatics and bioinformatics capabilities
- Develop expertise and understanding of all aspects of antimicrobial resistance
- Adopt a One Health approach to addressing public health issues by integrating information from human health surveillance, environmental and veterinary sources to provide a unified approach to infectious disease detection, characterisation and mitigation
- Develop clinical, science and technological services to support advanced research, data analysis, visualisation, and information processing
- Evaluate and compare point-of-care testing (POCT) devices as existing diagnostic technologies become miniaturised and connected to the internet. ESR will combine its national-level surveillance capability with real time high resolution data collected from POCTs
- Underpin our service delivery with a sound scientific research and clinical base.

Initiatives relating to health information systems include:

- Developing and maintaining a fully integrated notifiable disease surveillance system with health sector clinical information systems
- Enhancing our laboratory information management system (STARLIMS Health), including mobility, new tests, analytics and improved reporting
- Phasing the introduction of genomic technology to identify and test human pathogens. The use of this technology will dramatically improve our ability to analyse, map and respond to the impact of human pathogens in our food chain and in community, hospital and population health settings. Targeted investment of SSIF funding in our genomics and informatics capabilities will maximise the impact our scientists and clinicians make on health outcomes.

Safer communities

Increase the effectiveness of forensic science services applied to safety, security and justice investigations and processes.

Forensic Science Vision

Forensic intelligence, the art of using science and technology to understand and predict patterns of behaviour and crime, will be embedded in our science allowing us to better utilise forensic science to prevent, detect and solve crime. In partnership with our stakeholders, rapid, point of care solutions will be deployed, together with high end science consultancy to ensure the right information available in the right quality at the right time. ESR will provide a responsive and flexible approach to crime scene science. ESR's forensic services and expertise will be in demand worldwide.

Impacts

Our forensic science services improve justice outcomes by playing an important part in reducing crime, delivering

a trusted and internationally respected justice system, protecting New Zealand's security and providing a more responsive, effective and efficient justice system. We provide a wide range of forensic services from crime prevention to crime scene investigation and providing expert evidence in court.

Our work helps achieve our partners' goals to reduce total crime, violent crime, youth crime, reoffending and assaults on children.

The impacts of our work are:

- Criminal investigations are informed by highly reliable, independent evidence
- Early elimination of the innocent and the inclusion of suspects
- Better forensically informed court decisions
- Reduced drug and alcohol abuse of offenders
- Greater insight to sources of drug harm
- Inquiries by Coroners are informed by reliable toxicology
- Improved crime prevention through the Evidence Based Policing Centre.

Activities

We provide forensic services to the justice sector including New Zealand Police, courts, the New Zealand Customs Service, Coroners, pathologists and prisons.

To achieve these impacts our scientists:

Identify, interpret and collect evidence from crime scenes, including clandestine methamphetamine laboratories and firearms scenes

- Provide analytical expertise in DNA, trace evidence, toxicology and drugs
- Maintain New Zealand's DNA Profile Databank
- Provide expert evidence in court
- Test offenders participating in the Alcohol and Other Drug Treatment Court pilot scheme for alcohol and drugs
- Prevent drugs coming across our border by working closely with the New Zealand Customs Service

Our forensic services are compliant with the international quality accreditation requirements of the Laboratory Accreditation Board of the American Society of Crime Laboratory Directors (ASCLD/LAB).

Planned initiatives

Initiatives to improve justice outcomes include:

- Developing forensic DNA capabilities and specialist expertise in DNA interpretation, particularly in the interpretation of mixed DNA samples obtained from crime scenes. As a result we are better able to support criminal investigations by identifying up to four individual DNA profiles from a mixed sample
- Building a drug intelligence platform including collaborating with international partners to provide trends and patterns in the use of illicit drugs allowing government agencies better insights into intervention tactics, as well as supporting Emergency Departments and first responders with advice on risks and responses
- Identifying tissue sources of biological fluids and cells with sensitive new technologies such as RNA analysis and cell specific fluorescent labelling methods, enabling both the definitive identification of cell types of forensic significance and the separation of specific cell types in mixed case samples prior to DNA profiling. We will evaluate the use of microfluidics technology to improve speed of this technique
- Exploring opportunities in the area of massively parallel DNA sequencing techniques to maintain our position as a world leader in forensic DNA analysis, including the prediction of physical characteristics of alleged offenders based on the DNA sequences obtained from case samples, leading to faster identification of alleged offenders
- Examining ESR's case data to identify system constraints that if removed would allow us to improve turnaround times for forensic evidence
- Developing advanced crime scene recording and expert evidence presentation tools. The tools apply scene scanning technology to record locations of evidence in a way that allows people (such as jurors) to visit a virtual crime scene and clearly see the relationships between items of evidence, and make complex forensic evidence easier to understand. These technologies will lead to faster crime scene investigations, a simplified capture of accurate data, better presentations of key issues to the jurors, and a more efficient delivery of evidence at trial, saving time and cost. This technology is also being used to create virtual crime scenes to support Detective training at the Royal NZ Police College
- Translating research as part of the Evidence Based Policing Centre into actionable services that may prevent or disrupt crime.

Safer food

Enhance protection of New Zealand's food-based economy through the management of food safety risks associated with traded goods.

Food Science Vision

ESR will develop enhanced technologies and scientific knowledge which reduce risks from chemical and microbiological hazards in food.

Impacts

ESR's food science work plays an important role in maintaining the reputation of New Zealand food exports and contributes to government priorities (sustaining economic development and supporting the regions). We provide research, advisory, monitoring and diagnostic services to the Ministry for Primary Industries, the Ministry of Health and the food industry. We develop interventions to avoid, detect, mitigate and respond to foodborne hazards. Our expertise spans bacterial, viral, chemical, physical and radiological hazards in food. We have extensive national and international collaborative networks and access to a suite of tests accredited against international standards to help find out how, where and when food contamination has happened, as well as identify the type of contaminant and its source.

The impacts of our work are:

- Improved integrity and reputation of New Zealand's food exports
- Reduced risks to human health from contaminated food
- Episodes of illness and outbreaks caused by contaminated food are rapidly diagnosed and mitigated.

Activities

To achieve these impacts our scientists:

- Develop methods specifically to meet food safety requirements for overseas market access for New Zealand's primary product exports
- Develop new methods to improve the identification and detection time and allow for better mitigation of food safety risks and spoilage
- Conduct research and provide consultancy services to mitigate on-farm and in-plant sources of food contamination
- Detect foodborne pathogens and chemical hazards including radiological hazards present in foods and clinical samples
- Provide an effective emergency response to foodborne illness outbreaks
- Use human health surveillance to understand the epidemiology of foodborne illnesses
- Develop early warning systems to identify emerging foodborne hazards
- Provide information on levels of essential nutrients, trace elements and contaminants in New Zealand's food supply by assisting the Ministry for Primary Industries to conduct the New Zealand Total Diet Survey
- Assist regulatory and emergency decision making with sound, independent scientific evidence
- Provide information for better national, regional and global food safety policy development.

We will deliver solutions through science and research to New Zealand's food regulators, producers, manufacturers and exporters. In particular, we will continue to support the Ministry for Primary Industries and the Ministry of Health. In addition, as full partners in the New Zealand Food Safety Science Research Centre (NZFSSRC) we provide expert food safety research services to New Zealand's food industry.

We collaborate actively with other research organisations including Massey University, AgResearch, AsureQuality, Plant & Food Research and the Cawthron Institute (as partners in the NZFSSRC) and also with Massey and Otago Universities through One Health Aotearoa. We will continue to develop relationships with leading food science organisations around the world.

Planned initiatives

To improve food safety outcomes we will:

- Develop more sensitive, rapid and informative tools for the detection and characterisation of foodborne hazards and food components
- Develop and implement new risk assessment, risk modelling and risk mitigation tools
- Develop capability in meta-'omics of foods and food production environments
- Develop skills in economics relating to the burden of diseases including the cost/benefit of interventions
- Expand our bio-control tools beyond bacteriophages to tackle a wider range of pathogenic and spoilage microorganisms
- Develop our understanding of the impact of climate change on food safety and security
- Incorporate a One Health perspective into food safety issues, integrating information from human health surveillance, environmental and veterinary sources to provide a unified approach to risk detection and mitigation
- Collaborate with the NZ Food Safety & Science Research Centre to ensure ESR's work is aligned to their goals.

Cleaner water and environment

Improve the safety of surface water and groundwater resources for human use and the safer use of biowastes.

Water Science Vision

ESR will develop enhanced technologies and knowledge that improve the quality, management and regulatory oversight of drinking water, rivers, streams and groundwater. New treatment and management options will be developed for wastewater, effluent, greywater, sewage sludge and other organic waste with a focus on land application and re-use.

Impacts

ESR's science services improve water quality in New Zealand and reduce the amount of biowaste disposed in landfill. We provide health authorities, local and central government, industry and communities with scientific advice and expertise on the management of drinking water quality, surface water, groundwater, wastewater and biowaste. Our work includes national-level surveillance and reporting of drinking-water quality and regulatory compliance, information systems management, scientific advice on health and environmental public policy, research on water quality issues related to drinking water and recreational waters including source tracking of contaminants.

Our scientists lead and collaborate in the Centre for Integrated Biowaste Research (CIBR) to improve the sustainable management and reuse of biowaste.

The impacts of our work are:

- New Zealanders have safe well managed drinking water
- The water quality of rivers, streams and groundwater is improved
- Increased safe reuse of biowaste
- Environmental threats to human health from chemicals, microbes and physical contaminants are identified and mitigated
- Reduced burden of waterborne illness outbreaks.

Activities

To achieve these impacts our scientists:

- Support the national-level surveillance and reporting of drinking-water quality and regulatory compliance by the Ministry of Health
- Provide the Ministry of Health and DHBs with analysis, advice and risk assessments in relation to environmental, water, wastewater and hazardous substance issues
- Contribute to the Three Waters reform process led by the Department of Internal Affairs and the Essential Freshwater programme led by the Ministry for the Environment
- Conduct research into faecal source tracking (FST) and use FST to support local authority resource management with food and water borne illness outbreak investigations
- Use internationally recognised approaches for public health risk assessments of microbial (bacterial and viral) and chemical hazards in water
- Develop and use new, internationally recognised methods for the detection and mitigation of human pathogens and chemical hazards present in water, sediment, soil, biowastes and wastewater
- Conduct research to characterise contaminant pathways from land into and through groundwater and surface water systems, and the connections between these systems
- Research safe and sustainable treatment and reuse options for biowaste and wastewater
- Partner with iwi, communities and local authorities to improve governance and management systems for biowaste
- Research the impacts of hazards in the environment on human health (including air quality, contaminated land and common chemicals)
- Lead and participate in several groundwater research projects in collaboration with other CRIs and universities, and participate in work to fully integrate groundwater research in New Zealand in partnership with iwi and Māori
- Lead and participate in Pacific environmental and public health development projects, encouraging broad thinking to anticipate, prevent, prepare for and respond to integrated development and disaster threats.

We play a leadership role in the 'Our Land and Water' and 'Biological Heritage' National Science Challenges and support the 'Deep South' National Science Challenge.

Planned initiatives

To improve outcomes relating to water and the environment we will continue to:

- Assess measures of groundwater assimilation capacity for the key water contaminants of nitrates and microbial pathogens. These measures are used in water management by regional councils and district councils to evaluate options for the disposal of water and waste. We will increasingly partner with engineering firms, communities, iwi, farmers and local authorities to provide solutions to, and options for, issues that local authorities face in this area. This requires a wide range of interdisciplinary skills to explore the safe and sustainable reuse of biowaste
- Develop a ground water health index for rapidly assessing groundwater health and identifying of potential contaminant causes
- Develop a low-cost molecular method for targeting microbial identification in mixed samples such as groundwater and surface water, wastewater, soil and food
- Analyse and report data from the monitoring of New Zealand drinkingwater suppliers' regulatory compliance in the form of an annual water quality report for the Ministry of Health
- Provide advice to DHBs and local authorities on the investigation and management of issues related to air, land and water quality
- Collaborate with Pacific Island nations' governments to support national programmes for improved water and sanitation services and infrastructure
- Develop our skills in environmental genomics, including metagenomics-based approaches, to understand microbial communities in water, soils and biowaste to determine sources of contamination, and identify potential associated health risks
- Work with the University of Canterbury, Environment Canterbury, Christchurch City Council and other clients to aid the recovery of water quality and safety in Canterbury
- Investigate the potential of rongoā species and native ecosystems to reduce contaminants entering waterways.

Our people

A continued focus on our people and ESR culture is a critical success factor for us. ESR is focused on building a culture that is highly collaborative, agile, innovative, and based on trust and empowerment.

Organisational culture

Organisational culture continues to be a major driver of performance. ESR will build a culture that empowers and enables our people to work effectively in a rapidly changing environment and be agile in changing service deliverables to a range of clients with different needs. Driving culture change requires more than just focusing on changing the behaviours of individuals or the organisation. We will back this up with visible support and modelling from leadership and the right systems and processes to support the desired behaviour. Initiatives will be designed to support and communicate with managers and staff to assist in facilitating growth and innovation, and leading our staff through the changes ahead.

Workforce planning and capability development

Our people are fundamental to the delivery of our strategic priorities. We will focus on shaping our workforce to ensure that we plan for and build capabilities that align with future needs. We will create more integrated initiatives and approaches to drive people capability development in a diverse, yet highly specialised, workforce. This includes implementing a framework that identifies and nurtures key talent and supports organisational succession planning for key leadership and specialist roles.

We will continue to invest in the development of our leaders to ensure they are equipped to build the capability of their teams, lead our culture, and facilitate growth, change and innovation.

Science capability

ESR is conducting a major capability review to ensure ESR has the science capabilities and skill-base to meet current and future needs. Science capabilities we will grow include data science, genomics and informatics, statistics and social science.

We maintain relationships with universities, other CRIs and scientific research societies and will promote new collaborations that support our outcomes. We fund postgraduate studentship opportunities, encourage active participation in national and international conferences and encourage staff to undertake meaningfully aligned PhD studies. We encourage and support scientists who have new innovative ideas for science, particularly those at earlier stages of their careers, by funding their research through our Pioneer Fund.

Good Employer obligations

ESR values diversity and benefits from the knowledge and unique perspectives of a workforce that includes people of New Zealand European, Māori, Pasifika and Asian origin. Women represent nearly two thirds (66%) of our employees and work at all levels and roles in our organisation.

We will continue to demonstrate our commitment to being a good employer and advocating organisation-wide equal employment opportunity (EEO) practices relating to recruitment and selection, development, management and retention of staff.

Resources

Information technology

The successful delivery of our science services has become inextricably linked with technology as science continues to evolve. The evolution from the workbench to the workstation, combined with the exponential increase in the storage space required to support genomics science, will require significant change within our IT systems, information management and their governance. In response we have adopted the All of Government Infrastructure as a Service offering to provide on demand access to high capacity, high performance IT resources. We continue to build the IT platform to enable our growing data science capability, starting with strengthening ESR's national public health surveillance network. We look to embrace cloud wherever possible with the accelerated adoption of the Microsoft Azure and O365 platforms to modernise our corporate systems, introduce efficiencies through the use of automation and artificial intelligence and to empower our staff with ready access to on demand services. Our IT roadmap closely aligns with ESR's strategy with a focus on Digital Science and our Future Ways of Working initiative via our 'into the cloud' and 'lab of the future' projects.

Property and facilities

- ESR continues to focus on maximising the efficiency and utility of its science facilities in Auckland, Wellington and Christchurch. The property strategy will take account of the future operating model, proximity to major clients, access to skilled staff, ability to support growth into international markets, the potential for using hubs and co-locating with other science organisations, business continuity and financial considerations. A broad range of options have been considered for addressing the ageing facilities in Kenepuru including co-locating with other CRIs and science organisations. A detailed business case is under development for the replacement of the laboratories at Kenepuru by 2022/23.

The overarching goals of our property strategy are to:

- determine the most efficient and effective site use to meet business needs
- ensure that facilities support the specialised scientific capabilities required for excellent service to clients
- apply whole-of-life asset management practices to ensure that the assets remain robust and reliable to support our core business functions and long-term strategic science goals.

Intellectual property

We have policies and procedures in place relating to the access, use, maintenance, enhancement, exploitation and transfer of intellectual property and know-how. These policies and procedures ensure effective product and service development and the effective management of intellectual property. They also maximise the application of the results of research and technological developments, including transfers to end users and other third parties for the benefit of New Zealand. General principles and procedures relating to the intellectual property, research and benefits of research held by ESR meet the requirements of the Transfer Agreement between ESR and the Crown.

National reference collections

We maintain the New Zealand Reference Culture Collection (Medical section). We also assist other CRIs, universities and laboratories by providing access to the cultures in the collection on a cost-recovery basis. We will provide access to the reference collection except where access is clearly not to the benefit of New Zealand. The costs of collection, archiving and maintenance will be recovered only to the extent that they have not been paid for from public funding.

Costs for retrieval of information from databases and reference collections will be recovered where a third party wishes to obtain large portions of information from a database or reference collection for direct commercial use. In this case we reserve the right to negotiate a copyright, royalty or licence fee.

We will not dispose of any national database or reference collection without the prior written consent of shareholding Ministers, and will immediately notify shareholding Ministers if, in the Board's view, we cannot reasonably maintain the integrity, security and quality of any national database or reference collection. We will remain responsible for the reference collection until after shareholding Ministers have notified the Board of their determination regarding the future maintenance of, or access to, the database or reference collection. We will advise shareholding Ministers in a timely manner of any disputes over access to, or the use of, the reference collection held by us. Under the terms of the Transfer Agreement, shareholding Ministers can appoint a person with relevant expertise to decide the matter.

Financial Performance

Key assumptions

We have modelled several scenarios based on varying levels of revenue and investment in transformation.

The five-year financial forecasts included in this SCI are based on the following assumptions:

- significant internal efficiencies are achieved on the delivery of core government contracts
- corporate overheads are reduced by 3%
- revenue from our forensic software grows
- significant investment is made in transformation and new science capabilities
- Kenepuru Science Centre is replaced by 2022/23.

Revenue and profitability

Revenue and profitability are expected to improve out to 2021/22 as revenue from our forensic software grows further and the benefit of cost savings and efficiencies are realised, particularly across Corporate and Infrastructure areas and in the delivery of services to the Ministry of Health. Revenue forecasts are below those shown in ESR's 2018-2023 SCI due to a slower growth trajectory for ESR's forensic software revenue.

Profitability is expected to be lower than recent years as significant ongoing investment is required to transform our science and develop new products and services to ensure ESR's financial sustainability.

Development of science facilities at Kenepuru is expected to be completed in 2022/23. There will be a one-off non-cash expense when the remaining book value of the old KSC facilities is written off ($5.1m). Occupancy costs are planned to increase from 2022/23 as non-lab based staff are relocated to leased office space.

Profitability in 2022/23 and 2023/24 is expected to remain under pressure as occupancy costs increase and new revenue sources are being established.

Balance sheet management

The major items of capital expenditure include replacing the ageing facilities in Kenepuru and replacing some of our ageing and critical laboratory instrumentation. No debt will be required to fund ESR's capital programme, as it can be funded out of accumulated capital if the financial targets in this SCI are met. ESR will maintain sufficient cash to withstand short term cash flow shocks such as lower commercial revenue levels or higher than expected capital costs.

Risks

ESR faces several financial risks:

- if the targets for internal efficiencies on core contracts and corporate overhead reductions cannot be met, our government contracts will become unsustainable and science services/capability will need to be reduced
- if funding for research remains flat, we will not be able to maintain the critical mass of researchers that we need to be successful in improving the wellbeing of New Zealanders
- if revenue growth from STRmix™ is less than expected, affordability of our property strategy and investment in the science capabilities will be affected
- if the actual cost of replacing the Kenepuru science facilities is greater than expected we will need to identify potential cost savings to remain within the capital budget.

Dividend

It is not anticipated that ESR will have funds available for distribution due to the planned reinvestment in transformation, science capabilities and facilities.

Commercial Value

Section 16(3) of the Act requires ESR to provide an estimate of the current commercial value of the Crown's estimate. The net asset position (or total equity) is a reasonable proxy for the commercial value of the Group. The net asset position, as shown in accordance with ESR's accounting policies for 30 June 2018 was $54.3m.

Financial perfomance indicators

	Actual 2018	Plan 18/19	Plan 19/20	Plan 20/21	Plan 21/22	Plan 22/23	Plan 23/24
Revenue ($000s)	76,159	78,676	82,868	84,528	86,067	87,789	89,544
Revenue Growth		3.3%	5.3%	2.0%	1.8%	2.0%	2.0%
Operating Results ($000s)							
Operating Expenses	65,347	72,443	76,436	75,193	76,501	79,281	80,914
EBITDAF	10,812	6,233	6,433	9,335	9,566	8,507	8,630
Depreciation and Amortisation	5,538	5,862	6,922	6,922	12,064	7,358	7,794
EBIT	5,274	371	(489)	2,413	(2,498)	1,149	837
Net Profit after Tax	4,271	706	202	2,283	2,246	1,010	628
Net Profit after Tax (incl Kenepuru writedown)					(1,456)		
Total Assets	75,803	76,557	76,939	79,222	77,766	78,776	79,404
Closing Shareholders Funds	54,456	55,162	55,365	57,647	56,191	57,201	57,829
Capital Expenditure	4,696	6,176	7,940	18,153	17,653	15,353	6,653
Capital Expenditure % to revenue	6.2%	7.8%	9.6%	21.5%	20.5%	17.5%	7.4%
Liquidity							
Current Ratio	2.2	2.2	2.2	1.6	1.2	0.8	0.9
Quick Ratio (Acid Test)	2.1	2.1	2.0	1.5	1.1	0.6	0.7
Profitability							
Return on Equity (incl Kenepuru writedown)	8.2%	1.3%	0.4%	4.0%	-2.6%	1.8%	1.1%
Return on Equity (excl Kenepuru writedown)					3.8%		
Rolling Return on Equity (3 years)	9.2%	6.5%	3.2%	1.9%	2.8%	3.3%	2.3%
Return on Total Assets	7.2%	0.5%	-0.6%	3.1%	-3.2%	1.5%	1.1%
Operating Margin	14.2%	7.9%	7.8%	11.0%	11.1%	9.7%	9.6%
Operating Margin per FTE ($)	28,355	15,309	14,856	21,313	21,840	19,423	19,704
Operational Risk							
Profit Volatility	7.4%	38.0%	33.1%	27.4%	24.0%	19.8%	14.6%
Growth/Investment							
Capital Renewal	0.9	1.1	1.1	2.6	1.5	2.1	0.9
Dividend	–	–	–	–	–	–	–
Financial Strength							
Gearing (Debt/Debt Equity) %	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equity Ratio (Equity/Total Assets) %	71%	72%	72%	72%	73%	72%	73%
Cash and short term deposits ($Ms)	25.0	25.1	24.5	15.6	8.5	1.5	3.3
Debt ($Ms)	–	–	–	–	–	–	–

Appendix 1

Business policies

We operate in accordance with the purpose and principles as stated in the Crown Research Institutes Act 1992 and have statutory obligations under other acts, including the Companies Act 1993 and Crown Entities Act 2004. Significant services are performed for New Zealand Police under the Land Transport Act 1998 and the Misuse of Drugs Act 1975.

Policies and procedures are in place to ensure we meet all of our statutory obligations.

Our business policies include:

Risk management

Shareholder consent for significant transactions

Dividends

Information to be disclosed

Databases and collections

Health and safety

Intellectual property

Information management.

Appendix 2

Statement of significant accounting policies

Reporting entity

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

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 Institutes 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 International Financial Reporting Standards (IFRS) 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, certain leased assets 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.

Changes in accounting policies

Accounting policies have been applied on a basis consistent with the prior year.

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 judgements that have the most significant effect on amounts recognised in the financial statements are applied in the determination of revenue.

Revenue

The Group uses the stage of completion method in accounting for its fixed price contracts to deliver scientific services.

The use of the stage of completion method requires management to estimate the services performed to date as a proportion of the total services to be performed. The stage of completion is calculated and reviewed monthly, and significant variances are investigated to ensure that the stage of completion estimate is reasonable, in line with the overall project plan, estimated completion date and prior measurements of progress.

Principles of consolidation

Subsidiaries

The consolidated financial statements incorporate the assets and liabilities of all subsidiaries of ESR and the results of the operations of all subsidiaries.

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 businesses 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.

Associates

An associate is an entity over which the Group has significant influence. Significant influence is the power to participate in the financial and operating policy decisions of the investee, but is not control or joint control over those policies.

The Group's investments in its associates are accounted for using the equity method. Under the equity method, the investment in an associate is initially recognised at cost and subsequently adjusted to recognise the Group's share of

changes in net assets of the associate since the acquisition date. Goodwill relating to the associate is included in the carrying amount of the investment and is not tested for impairment separately.

In applying the equity method of accounting, the Group's share of the post-acquisition profits or losses of its associated companies is recognised in profit or loss and its share of post-acquisition other comprehensive income is recognised in other comprehensive income. These post-acquisition movements and distributions received from the associated companies are adjusted against the carrying amount of the investment.

Unrealised gains on transactions between the Group and its associated companies are eliminated to the extent of the Group's interest in the associated companies. Unrealised losses are also eliminated unless the transaction provides evidence of an impairment of the asset transferred.

After application of the equity method, the Group determines whether it is necessary to recognise an impairment loss on its investment in its associates. At each reporting date, the Group determines whether there is objective evidence that the investment in the associate or joint venture is impaired. If there is such evidence, the Group calculates the amount of impairment as the difference between the recoverable amount of the associate and its carrying value, and then recognises the loss within the statement of profit or loss.

When the Group's share of losses in an associated company equals or exceeds its interest in the associated company, including any other unsecured non-current receivables, the Group does not recognise further losses, unless it has obligations or has made payments on behalf of the associated company.

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 at 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	10 – 50 years
Leasehold improvements	10 years
Plant, equipment and vehicles	3 – 10 years
IT equipment and internal software	3 – 12 years

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 on a straight-line basis over the useful life of the asset (between 3 and 12 years).

Customer contracts

The intangible asset customer contracts represents 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 for use, which is the period of expected future sales from the related project.

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 value in use. For the purposes of assessing impairment, assets are grouped at the lowest levels for which there are separately identifiable cash flows (cash-generating units).

Taxation

Current tax

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).

Deferred tax

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 items.

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.

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 activities 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 or financing activities.

Investment cash

Investment cash represents cash held in bank deposits with original maturities of between 3 and 12 months. Investment cash movements are included in investing activities in the statement of cash flows.

Trade and other receivables

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

Collectability of receivables is reviewed on an ongoing basis. A provision for doubtful debts is established when there is objective evidence that the Group will not be able to collect all amounts due according to the original terms of receivables. Bad debts are written off in the period in which they are identified.

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.

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 rate method.

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 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.

Leases

Finance leases transfer to ESR, as lessee, substantially all the risks and rewards incidental to ownership of a leased asset. Initial recognition of a finance lease results in an asset and liability being recognised at amounts equal to the lower of the fair value of the leased asset or the present value of the minimum lease payments. Each lease payment is allocated between the liability and finance charges so as to achieve a constant rate of finance charge over the term of the lease. Property, plant and equipment acquired under a finance lease are depreciated over the shorter of the useful life and lease term of the asset.

Leases in which a significant portion of the risks and rewards of ownership are retained by the lessor are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are charged to the statement of profit or loss and other comprehensive income on a straight-line basis over the period of the lease.

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.

Revenue

Sales of goods and services

Revenue is earned by ESR in exchange for the provision of outputs (services) to third parties.

Revenue from the supply of services is measured at the fair value of consideration received and recognised in the accounting period in which the services are rendered.

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, costs 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 a 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 licence, 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 licences and training is recognised at a point in time when, respectively, the customer has been provided with access to the software licence 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 upgrade and enhancements as and when they are available. Software support revenue is recognised as the customer utilises the support purchased with the software licence.

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 stand alone selling price or estimated based on industry benchmarks.

Financing components

The Group does not expect to 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.

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 and recognised at fair value in the statement of profit or loss and other comprehensive income when the requirements under the funding agreement have been met.

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.

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.

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.

Financial instruments

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 of management, the relationship with other instruments and the reporting costs and benefits associated with each designation. The designations applied by ESR are reflected in the financial statements.

Financial assets

The Group classifies its financial assets as loans and receivables and at fair value through profit and loss. Management determines the classification of its financial assets at initial recognition.

Loans and receivables 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 loans and receivables 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. Loans and receivables are carried at amortised cost using the effective interest rate method.

The Group assesses at each reporting date whether there is objective evidence that a financial asset or a group of financial assets is impaired. A financial asset or group of financial assets is impaired and the impairment losses are incurred only if there is objective evidence of impairment as the result of one or more events that occurred after the initial recognition of the asset (a 'loss event') and that loss event (or events) has an impact on the estimated future cash flows of the financial asset or group of financial assets that can be reliably estimated. Evidence of impairment may include indications that the debtor or group of debtors is experiencing significant financial difficulty, default or delinquency in interest or principal payments, the probability that they will enter bankruptcy or other financial reorganisation, and where observable data indicates that there is a measurable decrease in the estimated future cash flows, such as changes in arrears or economic conditions that correlate with defaults.

Financial liabilities

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

Adoption status of relevant new financial reporting standards and interpretations

New and amended standards adopted by the group

IFRS 9 Financial Instruments

NZ IFRS 9 addresses the classification, measurement and recognition of financial assets and financial liabilities. It replaces the guidance in NZ IAS 39 that relates to the classification and measurement of financial instruments. The Group adopted NZ IFRS 9 on 1 July 2018. There is no material impact from the adoption of this standard.

IFRS 15 Revenue from Contracts with Customers

The Group has adopted IFRS 15 Revenue from Contracts with Customers from 1 July 2018 which has resulted in changes in accounting policies and adjustments to the amounts recognised in the financial statements. In accordance with the transition provisions in IFRS 15, the Group has adopted the new rules using the modified retrospective approach and has restated opening retained earnings for the 2019 financial year.

The Group has elected not to early adopt any of the new standards and amendments to existing standards which have been issued but that are not yet effective. It is anticipated that these standards will not significantly impact the financial statements of the Group once adopted, with the exception of NZ IFRS 16.

NZ IFRS 16, Leases (effective for annual periods beginning on or after 1 January 2019)

NZ IFRS 16 introduces a single lessee accounting model and requires a lessee to recognise right-of-use assets and liabilities for all leases with a term of more than 12 months, unless the underlying asset is of low value. The Group has yet to assess the full impact of NZ IFRS 16. The Group will apply this standard from 1 July 2019.

Appendix 3

Directory

Board of Directors

Denise Church QSO – Chair

Quentin Hix – Deputy Chair

Dr Helen Darling

Richard Gill

Dr Andy Shenk

Professor Cristin Print

Kate Thomson

ESR Senior Leadership Team

Dr Keith McLea, Chief Executive

Brett Cowan, General Manager, Research and Chief Scientist

John Bone, General Manager, Forensic and Digital Services Development

Dr Libby Harrison, General Manager, Health and Environment

Amber McEwen, General Manager, Business Services

Trish Bolger, General Manager, People, Culture and Communications

Registered office

Kenepuru Science Centre

34 Kenepuru Drive
Porirua 5022
PO Box 50348
Porirua 5240
New Zealand
Tel: +64 4 914 0700
Fax: +64 4 914 0769
www.esr.cri.nz

Auditor

Chris Ussher of PricewaterhouseCoopers on behalf of the Auditor-General

Banker

ANZ Bank New Zealand Limited

Kenepuru Science Centre

34 Kenepuru Drive
Porirua 5022
PO Box 50348
Porirua 5240
New Zealand
Tel: +64 4 914 0700
Fax: +64 4 914 0770

Christchurch Science Centre

27 Creyke Road
Ilam
Christchurch 8041
PO Box 29181
Fendalton
Christchurch 8540
New Zealand
Tel: +64 3 351 6019
Fax: +64 3 351 0010

National Centre For Biosecurity and Infectious Disease (NCBID) – Wallaceville

66 Ward Street
Wallaceville
Upper Hutt 5018
PO Box 40158
Upper Hutt 5140
New Zealand
Tel: +64 4 529 0600
Fax: +64 4 529 0601

Mt Albert Science Centre

120 Mount Albert Road
Mount Albert
Auckland 1025
Private Bag 92021
Victoria Street West
Auckland 1142
New Zealand
Tel: +64 9 815 3670
Fax: +64 9 849 6046