BUILT ENVIRONMENT LEADERS FORUM

SUMMARY OF FINDINGS

JUNE 2017

THE BUILT ENVIRONMENT LEADERS FORUM WAS A JOINT INITIATIVE INCLUDING:

EQC EARTHQUAKE COMMISSION Kōmihana Rūwhenua — eqc.govt.nz

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI — mbie.govt.nz

BRANZ — branz.co.nz

Tonkin + Taylor

Fletcher Construction

GNS Science

TOGETHER WITH MANY PUBLIC AND PRIVATE SECTOR PARTICIPANTS SEEKING POSITIVE BUILT ENVIRONMENT OUTCOMES.

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DISCLAIMER

The findings in this report back are those deriving from the Built Environment Leaders Forum September 2015 and do not necessarily reflect official policy or position of any agency. Examples presented within this report are only examples for the purpose of demonstration.

It is recommended that users exercise their own skill and care with respect to their use of the information contained in this report back and that users carefully evaluate the accuracy, currency, completeness and relevance of the material for their purposes. This information is not a substitute for independent professional advice and users should obtain any appropriate professional advice relevant to their particular circumstances.

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EXECUTIVE **SUMMARY**

The Canterbury and Kaikoura earthquakes have highlighted vulnerabilities in the way we build, the land we build on, and the fragility of our infrastructure. To effect change and achieve a more resilient built environment we must reflect on the lessons from these earthquakes, review all the hazards we face in New Zealand, and look for opportunities to improve our built environment.

This initiative goes much further than simply focusing on the technical design of buildings and infrastructure; the real challenge is to create environments in which all New Zealanders can live well and lead fulfilling lives.

No single institution has oversight over the entire built environment. Improving the resilience of the built environment must be a public, private, and community-driven endeavour.

We need to take greater account of sustainability, effective land use, climate disruption, technological advances, and the vexing issue of housing affordability and quality. Building materials and methods, the regulatory environment, and design options must be fit-for-purpose for the 21st century.

This demands a holistic perspective to resilience; to explore ideas, innovation, and new technologies; to promote new ways of thinking; to prioritise actions; and, ultimately, to propose solutions that will provide all New Zealanders with a greater choice of living styles, nurture our sense of community, and enable us all to live well and sustainably with our natural environment.

The earthquakes in Canterbury acted as a catalyst for the 2015 Built Environment Leaders Forum attended by 200 built environment leaders from across New Zealand and internationally. The Forum attendees included representatives of environmental, social, and cultural interests, as well as chief executives, directors and principals of businesses from engineering, architecture, planning, lifeline utilities, building, banking, insurance and legal communities, technical experts and researchers. Central and local government representation included councillors and officials from both small and large councils.

The output from the Forum resulted in a set of prioritised actions intended to 'make a positive difference'.

The Built Environment Leadership Steering Committee will continue to support actions that achieve a much more resilient built environment for New Zealand.

PRIORITY **FINDINGS**

The following priorities were identified at the Built Environment Leaders Forum held in September 2015.

THEME	ACTION
GOVERNANCE AND LEADERSHIP	1. Develop stronger collaboration between agencies in the public and private sector to improve built environment performance. 2. Identify and improve the resilience of New Zealand's most critical infrastructure components/systems. 3. Revisit and re-emphasise the roles and responsibilities of Lifeline Utilities and Lifelines Groups in achieving more resilient infrastructure networks.
DECISION-MAKING FRAMEWORKS	4. Clarify the decision-making frameworks for built environment resilience, including those for investment, land use planning, research, decision points, and likely trade-offs. 5. Improve consistency in approach across regulations, standards, codes, and guidelines applicable to the built environment. 6. Support central and local government capability to effect positive change in the built environment.
INCENTIVES AND TOOLS	7. Assess if the right financial and non-financial instruments are in place to support built environment resilience improvement and optimise risk management. 8. Support a targeted approach to making community building stock more resilient by providing communities a framework to prioritise action in towns and cities.
PUBLIC ENGAGEMENT AND COMMUNICATION	9. Lift building owners' and occupants' understanding of hazards and resilience. 10. Improve community involvement when considering built environment hazard and risk management mechanisms. 11. Engage the public on levels of service expectations for infrastructure.
INFORMATION: DATA AND EVIDENCE	12. Develop the evidence required to inform improved governance and leadership, decision-making frameworks, incentives and tools, and public engagement and communication that lead to improvements in the resilience of New Zealand's built environment. 13. Identify effective strengthening measures (in codes and guidance) within the built environment that deliver the most effective benefit-cost resilience gains. 14. Examine systems approaches to understand interdependencies within and among infrastructure services to improve understanding of the broader direct and indirect costs.

FOREWORD

New Zealand is a small economy in a high-hazard environment – we have limited capacity to financially absorb high-impact events such as the Canterbury and Kaikoura earthquakes, and, above all, the cost of low resilience. We must therefore prepare as best we can for the unexpected.

In September 2015, the Built Environment Leaders Forum brought together 200 built environment leaders to identify actions needed to improve the way we manage natural hazard risks to our urban and rural communities. This event was supported by many individuals and entities including substantial support from the Earthquake Commission (EQC), the Ministry of Business Innovation and Employment (MBIE) and the Building Research Association of New Zealand (BRANZ).

Over the two days, Forum participants heard from a range of international and local speakers who provided key messages on built environment resilience across five main themes – strategic directions, economics of resilience, smarter land use, better building performance, and resilient infrastructure. A facilitated workshop approach was used to gain input from the Forum participants. The Forum identified a set of prioritised findings from what was heard.

This Summary of Findings sets out priority actions, from a longer list of possible actions. Some actions are large initiatives that will take time to achieve, while others are quick-wins that can be incorporated into existing work programmes.

To effect change there needs to be a co-ordinated, multi-agency work programme with clear pathways to implementation, involving government, the private sector, and communities. The Built Environment Leadership Steering Committee will continue to facilitate progress towards a more resilient built environment for New Zealand.

Roger Fairclough, Chair
Built Environment Leadership Steering Committee

roger.fairclough@neoleafglobal.co.nz


Source: Neo Leaf Global


Source: Wellington on a plate by Ed / CC BY 4.0


Source: GNS Science

BUILT ENVIRONMENT **LEADERS FORUM**

BUILT ENVIRONMENT LEADERS FORUM

The Built Environment Leaders Forum presented an opportunity to develop an integrated approach to enhancing living standards for New Zealanders, by improving productivity, supporting social wellbeing, delivering positive net environmental outcomes, and increasing the awareness of risk management.

The built environment refers to the facilities and services supporting our urban and rural communities. These include buildings, infrastructure, and recreational facilities.

On 10-11 September 2015, senior government officials and private sector leaders gathered at the Built Environment Leaders Forum in Wellington to discuss and identify priorities for improving the way we manage risks to New Zealand's built environment. The theme for this event was largely driven by the Canterbury earthquakes and the lessons learned from these experiences. The Forum was a joint initiative with substantial support from EQC, MBIE and BRANZ. Strong support was also provided from other participants including the Ministry for the Environment, Treasury, Ministry of Civil Defence and Emergency Management, Department of Prime Minister and Cabinet, Land Information New Zealand, GNS Science, Christchurch City Council, and Local Government New Zealand.

The purpose of the Forum was to:

- take lessons from Canterbury and turn them into actions for improving the performance of New Zealand's built environment
- improve the treatment of risk in built environment policy, investment, and design
- create a Summary of Findings for improving the performance of the built environment.

The discussion was framed by a document produced by MBIE that focused on the built environment lessons learned from the Canterbury earthquakes.

This Summary of Findings identifies a range of priorities that, when implemented, will contribute to increasing the resilience of New Zealand's built environment.

The term resilience has many meanings depending on the context within which it is used. For the 2015 Forum, we adopted the United Nations Office for Disaster Risk Reduction (UNISDR) definition of resilience which is:

'The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.'

Source: Johnston

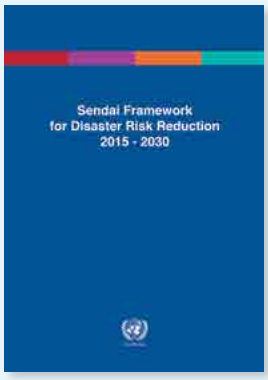
FIT WITH WIDER RESILIENCE FRAMEWORKS

The Built Environment Leaders Forum and the resulting findings align with a number of other frameworks at international, national, and regional/local levels.

International

At the international level this initiative contributes to New Zealand's response to achieving disaster risk reduction, which is one of the priorities for action (Priority 3: Investing in disaster risk reduction for resilience) of the Sendai Framework for Disaster Risk Reduction 2015-2030 adopted in Sendai, Japan in 2015.

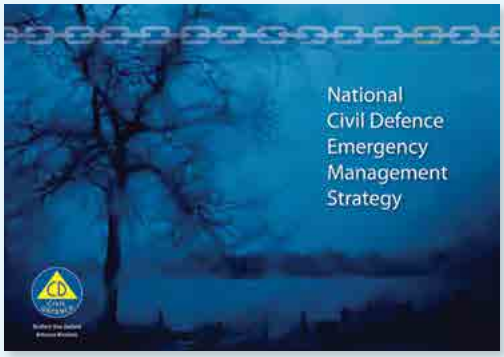
The framework is available at:
www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf



National

At the national level, increasing built environment resilience through this initiative will also respond to one of the goals of the Ministry of Civil Defence and Emergency Management's National CDEM Strategy, aimed at reducing the risks from hazards to New Zealand. It will inform the National Disaster Resilience Strategy under development.

The strategy is available at:
www.civildefence.govt.nz/assets/Uploads/publications/national-CDEM-strategy-2008.pdf

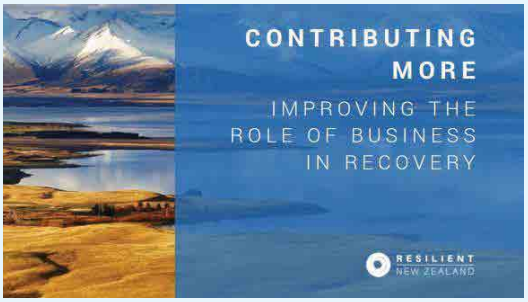


The following diagram shows that national resilience incorporates a range of components and operates from the individual level to society as a whole.

Source: MCDEM

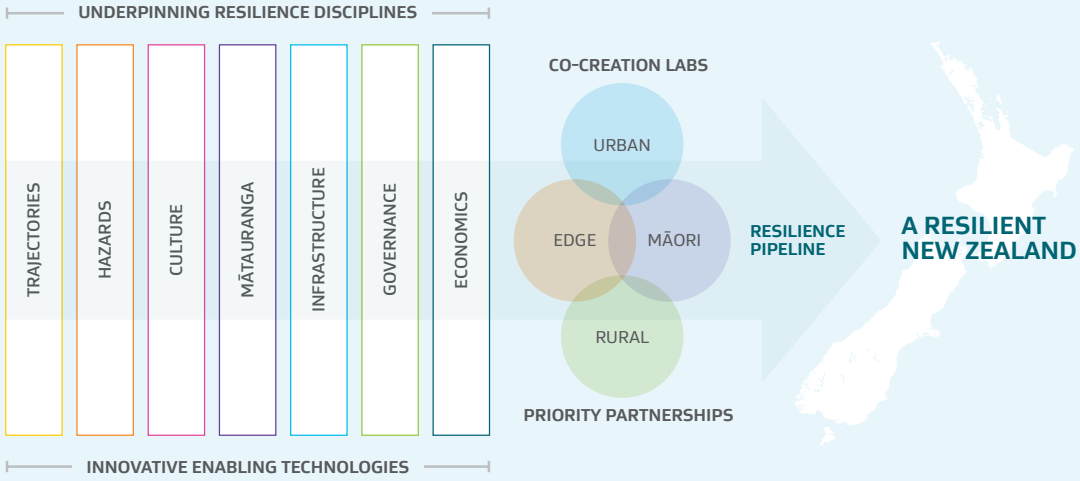
Further national initiatives seeking to increase New Zealand's built environment resilience include:

- The Treasury – Thirty Year New Zealand Infrastructure Plan 2015 document
- Local Government New Zealand – proposal to establish a Local Government Risk Agency
- Resilient New Zealand – a public/private sector initiative with a focus on business continuity



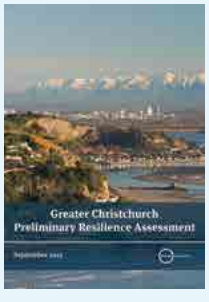
- Resilience to Nature's Challenges – a national science challenge providing research funding for resilience projects responding to natural hazards
- Building Better Homes, Towns and Cities – a national science challenge aiming to drive fundamental change in how we create our dwellings, towns, and cities
- QuakeCoRE – World leading research on earthquake resilience
- New Zealand Geospatial Research and Development Priorities and Opportunities – geospatial elements need to be considered to achieve built environment resilience
- Ministry for the Environment – national guidance on natural hazards
- New Zealand Lifelines – representatives of utilities collaborate in regional Lifeline Groups with scientists, engineers, and emergency managers to reduce vulnerabilities to regional scale events.

RESILIENCE TO NATURE'S CHALLENGES – NATIONAL SCIENCE CHALLENGE



Local

Two cities in New Zealand are part of the global 100 Resilient Cities Programme (Christchurch and Wellington) and are advancing resilience strategies for their cities. Other cities in New Zealand are also developing strategies for reducing risks and achieving more resilient built environments through their regional and district plans and policies.



INTERNATIONAL COLLABORATION

LUCY JONES

SCIENCE ADVISOR FOR RISK REDUCTION, US GEOLOGICAL SURVEY

Resilient buildings – Key insights:

- factor 'tails of probability' into decision-making
- provide better public understanding of key building design concepts such as seismicity, z-factors, and serviceability limit state versus ultimate limit state performance levels
- communicate building performance science to the public, building owners, and decision makers through scenarios
- recognise that our buildings are connected to other necessary infrastructure components therefore a systems view is needed when looking at resilience
- protect our building assets and people by addressing critical vulnerabilities in infrastructure systems.

'It was pretty obvious to see our buildings, our water system, and telecommunications are factors that are part of keeping society going and where we needed to focus our efforts.'

LAURIE JOHNSON

URBAN PLANNING & DISASTER RECOVERY CONSULTANT
San Francisco

Smarter land use – Key insights:

- set land use planning goals to achieve resilience:
  - keep future development OUT of known hazard areas
  - keep hazards from AFFECTING existing developed areas
  - strengthen existing developments to RESIST hazards
- learn from land-use planning tool kits already developed for areas susceptible to tsunami, flooding, storm surges, and other hazards (eg hazard-specific set-backs, land re-adjustments, and subdivision regulations; property acquisition; transfer of development rights; flood protection systems; movement of communities)
- require community engagement and effective governance structures.

'To really achieve resilience we have to get governance right.'

TOM O'ROURKE

THOMAS R. BRIGGS PROFESSOR OF ENGINEERING, CORNELL UNIVERSITY
New York

Resilient infrastructure – Key insights:

- recognise that there are global consequences of failure (eg location of generators at floodable level at the Fukushima power plant led to the shutdown of many nuclear plants around the world)
- design beyond the levels of normal probability – we know what's happening up to the 95% level but not beyond
- identify and re-assess critical infrastructure – we can't afford to fix everything
- build pipes back better (next generation) and install flexible pipe liners for critical water pipelines
- leverage private equity and identify the co-benefits of investment in resilience.

'There is a time when you have learned enough to be able to apply something. So I hope that everyone who has come to this Forum will actually, from this point onward, do something, so that it's not déjà vu all over again.'

MICHAEL NOLAN

AECOM GLOBAL TECHNICAL LEAD
Climate Adaptation, Melbourne

Smarter land use – Key insights:

- recognise that natural hazard events worldwide are increasing
- private sector want to know the value of resilience so they can invest in it
- develop resilience scorecards (as used by 100 Resilient Cities programme), which show where cities are weak or strong in terms of resilience
- promote resilient properties (majority approach) rather than focusing on high-risk properties (minority).

'As corporations we need to step forward and actually be strongly involved because the economies we work in are at risk.'

These speakers responded to key questions on how to improve resilience across the themes – strategic issues, economics of resilience, land use planning, systemic issues, resilient buildings and resilient infrastructure.

SUMMARISING THE FINDINGS

A facilitated workshop approach was adopted so that Forum participants could provide input to the discussions. For each of the themes, actions were identified and these were collated and ranked at the end of the Forum. The day after the Forum, the Steering Committee and the keynote speakers met to help refine the actions.

In December 2015, a smaller group of public and private sector experts who had attended the Forum met to finalise and rank the priority order of actions as presented in this Summary of Findings.

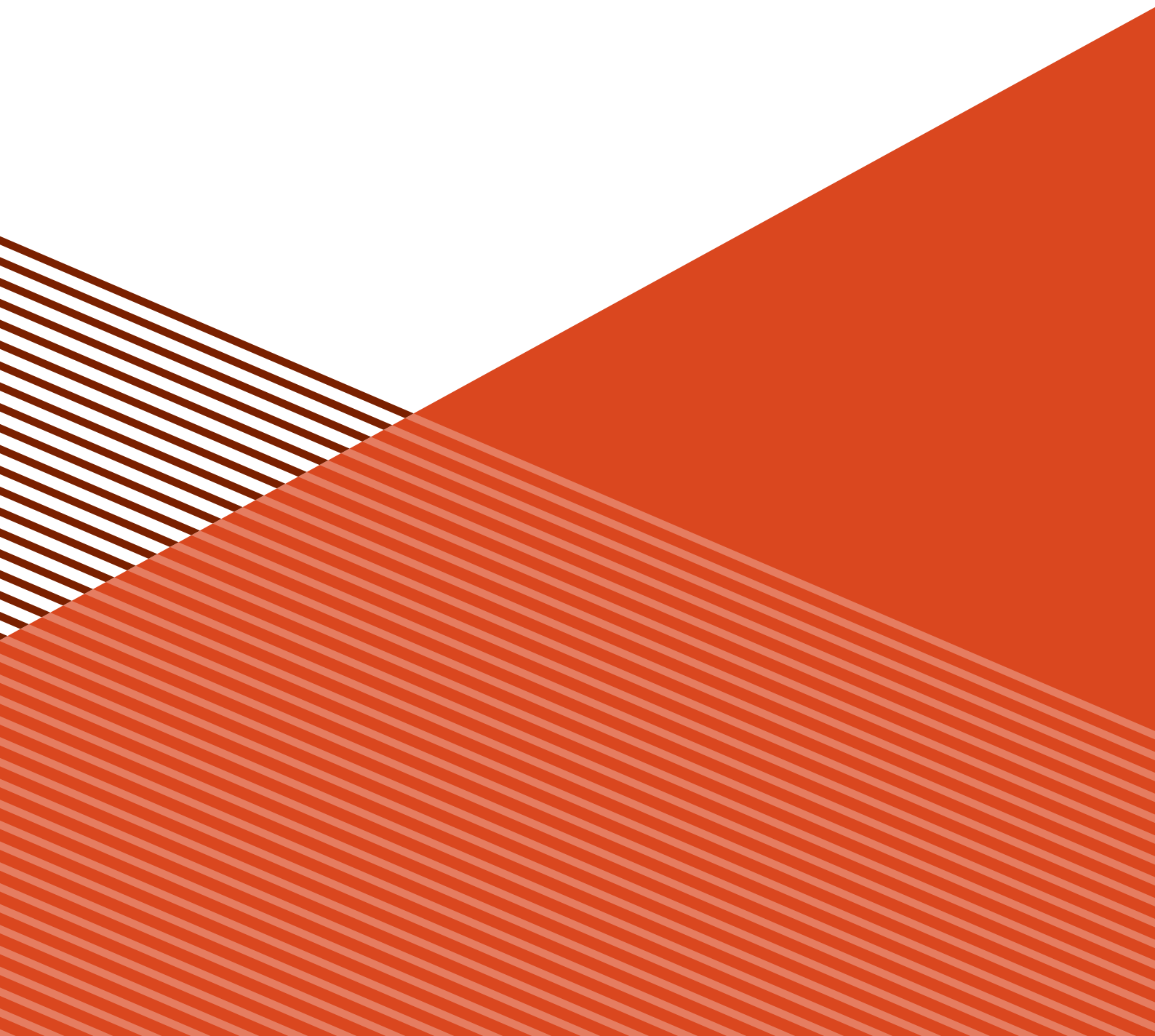
IMPLEMENTING THE FINDINGS

Outputs from the Forum can be integrated into current initiatives such as the National Disaster Resilience Strategy; regional hazard management strategies; local-level resilience strategies (eg the Wellington City Council and Christchurch City Council Resilience Strategies); the National Infrastructure Plan; resilience strategies of infrastructure owners and operators; and a range of other private and public sector resilience strategies and plans. The findings will also help spark new actions across a range of enterprises – both public and private. The take up of these findings will be overseen by the Built Environment Leadership Steering Committee.

The following sections provide detail on the Forum findings.

Source: Tonkin + Taylor

WHY A MORE **RESILIENT BUILT ENVIRONMENT?**



WHY A MORE RESILIENT BUILT ENVIRONMENT?

New Zealand has enormous opportunities to modify the built environment over time to be more resilient and, in turn, support improvements in living standards for New Zealanders. Improvements cannot be instantaneous and must work within the capital and operational investment cycles. In considering the built environment and improvements in living standards, recognition needs to be given to the social, human, natural, and economic capital New Zealand has at present and our aspirations for the future.

New Zealand has a range of hazards extending beyond natural hazards including for example hazards posed by infrastructure failure. All of these hazards have the potential for shocks and stresses, many of which play out over extended periods. New Zealand is changing rapidly; trends include an increasing population in the upper North Island, changing demographics, and rapidly changing technology. All of these challenges were in scope for the Built Environment Leaders Forum. For the 2015 Forum, the Canterbury earthquakes provided a timely entrée and, consequently, a greater focus on natural hazards.

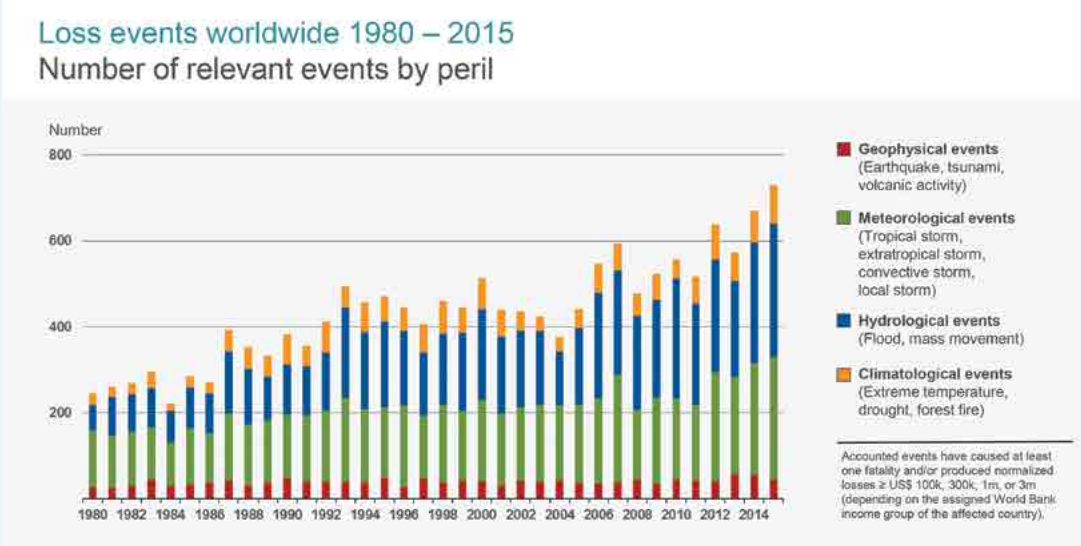
In thinking about our built environment and improving resilience, there are some key pressures that New Zealand currently experiences:

NEW ZEALAND HAS A HIGH EXPOSURE TO NATURAL HAZARDS

Much of our built environment is located in areas that are subject to the effects of natural hazards, both seismic and meteorological. We need to be as ready as possible to respond to future events by promoting incremental changes that accumulate over time and become significant.

Source: MCDEM

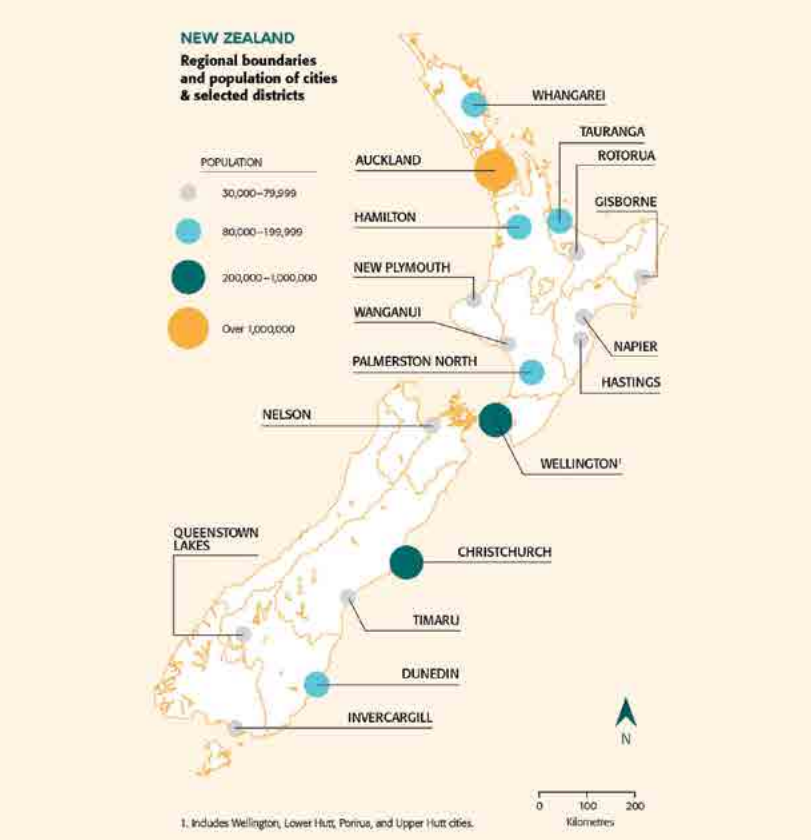
CLIMATE-RELATED NATURAL HAZARD EVENTS WORLDWIDE ARE INCREASING



Source: Munich Re.

OUR BUILT ENVIRONMENT IS CONCENTRATED IN VULNERABLE COASTAL LOCATIONS

New Zealand's population of around 4.6 million people (Statistics New Zealand) is highly urbanised with 85 per cent of the population living in urban areas and 30 per cent living in Auckland City alone.



Source: Statistics NZ

WE ARE A SMALL ECONOMY WHERE HAZARD EVENTS HAVE A LARGE IMPACT

New Zealand's economy would have trouble coping with future hazard events with impacts on the built environment as great as those from the Canterbury and Kaikoura earthquakes.

Source: GNS Science

OUR CITY SYSTEMS ARE BECOMING INCREASINGLY COMPLEX

We need to recognise interdependencies and gain a better understanding of which systems or parts of systems are critical/necessary, especially infrastructure systems. The view needs to be of urban systems rather than just buildings and infrastructure.

Source: GNS Science

WE NEED TO REDUCE THE RISKS OF NATURAL HAZARDS TO OUR BUILT ENVIRONMENT TO ACHIEVE MORE RESILIENT, WELL-FUNCTIONING CITIES.

By introducing the concept of resilience into investment and operations, opportunities exist for low incremental cost interventions for large savings in the future. This is generally referred to as the resilience dividend. Resilient buildings and infrastructure are safer and have a longer life. Buildings can be located and designed in a way that the repair costs are less and there is a shorter time to recovery if an event does happen. For businesses, reduced disruption maintains business continuity with economic and social benefits.

Source: Dave Allen NIWA

PRIORITY **FINDINGS**

'From consideration of Forum outputs, a number of key themes emerged as being essential to achieving a resilient built environment.'

Source: Port Lyttleton, Christchurch by Bernard Spragg / CC0 1.0 Public Domain

FRAMEWORK FOR RESILIENCE

From consideration of Forum outputs, a number of key themes emerged as being essential to achieving a resilient built environment. These are represented in the diagram below and include:

- a framework and governance at the national level for managing risks to the built environment
- incentives and tools that enable and justify appropriate levels of private and public sector investment in urban resilience
- building public understanding of the risk of natural hazards, and raising community awareness about on the consequences of not investing in resilience and the trade-offs if we do
- data and evidence to 'sell' the resilience story and to develop risk mitigation measures
- closer collaboration between central and local government, and between the private and public sectors on resilience issues.

Source: Auckland King Tides Initiative

The following pages identify and comment on the most important findings.

GOVERNANCE AND LEADERSHIP

Actions

1. **Develop stronger collaboration between agencies in the public and private sector to improve built environment performance.**
2. **Identify and improve the resilience of New Zealand's most critical infrastructure components/systems.**
3. **Revisit and re-emphasise the roles and responsibilities of Lifeline Utilities and Lifelines Groups in achieving more resilient infrastructure networks.**

Source: The Beehive by Andy Palmer/LINZ / CC BY 4.0

Commentary

The current siloed approach to leadership in the built environment continues to expose weaknesses. There needs to be joint action between central and local government and with private sector operators to improve efficiency and effectiveness.

Consideration is currently being given to the establishment of a Local Government Risk Agency (LGRA), which would offer a valuable contribution in addition to the activities of the National Infrastructure Unit, regional Lifelines Groups, the Insurance Council, the EQC, and others.

There is a distinct need for private-public partnerships and opportunities exist to build these through industry associations such as the Property Council and Infrastructure New Zealand.

The role of built environment leadership could be crucial in the absence of institutional frameworks spanning the complete built environment.

The cities of Christchurch and Wellington now have Chief Resilience Officers and Auckland has a Chief Sustainability Officer. These initiatives should be replicated elsewhere. That said, smaller communities struggle with capacity and capability.

The Chief Science Advisor's office is actively involved in raising the profile of risk and risk management at a national level. Along with a range of science initiatives, this demonstrates the value of integrating research activities more strongly into the governance framework. Integrating science leaders into this initiative will result in research directed towards New Zealand's needs.

Strengthened and transparent leadership in the built environment will improve social, environmental, economic and risk management outcomes.

In addition to these priority actions, one of the main messages from the Forum was to achieve collaboration between the fire and water services to provide water supply for fire-fighting after earthquakes.

BUILT ENVIRONMENT LEADERSHIP

INDUSTRY ASSOCIATIONS AND INSTITUTES	NZ Institute of Architects, NZ Planning Institute, Engineering New Zealand, Infrastructure New Zealand, Certified Builders, MasterBuilders, NZ Building Industry Federation, NZ Green Building Council, Construction Clients Group, Construction Industry Council, NZ Fire Service, NZ Property Council, NZ Geotechnical Society, NZ Society of Earthquake Engineering, Structural Engineering Society of NZ, Insurance Council of NZ, Real Estate Institute of NZ
PROFESSIONAL SERVICES	Architects, Building Designers, Engineers, Quantity Surveyors, Project Managers, Construction companies, Professional Service Consultants
BUILDING OWNERS AND MANAGERS	Building Owners, Building Managers, Asset Managers, Facilities Managers
INFRASTRUCTURE OWNERS AND MANAGERS	Energy (liquid fuel, gas, electricity), Water (3 waters), Telecommunications (cell, landlines), Transportation (road, rail, port, airport), Lifelines managers
PLANNING AND DEVELOPMENT	Surveyors, Planners, Urban Designers, Landscape Architects, Property Developers
URBAN COMMUNITY	Iwi leaders, Community leaders, Employers
FINANCIAL ADVISORS	Property Investors, Bankers, Valuers, Economists, Insurers
RESEARCHERS	Crown Research Institutes (GNS Science (hazards), NIWA (weather), BRANZ (building)), Universities (research/education), Social Scientists, Building Scientists, National Science Challenge Directors, Natural Hazard Research Platform, NZ Institute of Economic Research, private research leaders
LOCAL GOVERNMENT	LGNZ, Mayors and Councillors, Chief Executives, Resilience Officers, Building Consent Managers, Strategic Planners, Policy Managers, Emergency Managers
CENTRAL GOVERNMENT	DPMC (governance), Treasury (finance), MCDEM (emergencies), MBIE (building/infrastructure/energy/labour), MOT (transport), NZTA (land transport), Housing NZ (social housing), MFE (Environment), (resource management), Education (schools), LINZ (land data), EQC (insurance, reinsurance, research and education)

DECISION-MAKING FRAMEWORKS

Actions

1. **Clarify the decision-making frameworks for built environment resilience, including those for investment, land use planning, research, decision points, and likely trade-offs.**
2. **Improve consistency in approach across regulations, standards, codes, and guidelines applicable to the built environment.**
3. **Support central and local government capability to effect positive change in the built environment.**

Source: National Forward Works Viewer Team

Commentary

Decision-making frameworks need to be robust and consistent across New Zealand, at the same time recognising local priorities. An example is the Earthquake-Prone Building legislation being led by MBIE. Built environment sector groups need an approach to value resilience in their investment business cases. Decision-making frameworks need to span across community assets for residential, commercial, industrial, and recreational use as well as the services to and from them. A specific example of this is the concept of 'strategic corridors' through communities for use in an emergency. These frameworks offer considerable value and will take some time to implement.

To assist decision making, the Treasury Living Standards framework provides a strong base for decision-making frameworks and needs real applications to develop further.

Community engagement in evidence-based decision making is important but challenging. There is a need to improve practice in this area, especially with respect to communication.

At an analytical level, we struggle with 'fat tail' distributions of risk. These are the 'killer' risks that much of policy deals with, such as the 'life safety' objectives in the Building Act.

Being able to assess risk from a systems view is challenging and risk mitigation strategies need to be developed to accommodate systemic risks, cascading risks, and cumulative risks.

We are now in a much more rapidly evolving built and social environment. The timeliness of decision making is becoming increasingly important.

Other actions considered important included amendments to the land use planning legislation (the Resource Management Act 1991) to establish a consistent and national basis for recognising natural hazards, and developing technical expertise in built environment resilience issues and decision-making processes across the public and private sector.

INCENTIVES AND TOOLS

Actions

1. **Assess if the right financial and non-financial instruments are in place to support built environment resilience improvement and optimise risk management.**
2. **Support a targeted approach to making community building stock more resilient providing communities a framework to prioritise action in towns and cities.**

Source: GNS Science

Commentary

These actions came from the Forum sessions on the Economics of Resilience, Resilient Buildings, and Resilient Infrastructure. The common themes across these are:

- a clearer picture of the economic dimensions of risk management and resilience decisions is required, and
- the ability to incentivise individual asset owners and the community to integrate resilience in capital investment and asset management.

These actions are about creating an environment in which there is an integrated approach to risk management that considers the spectrum of risk treatment options including avoidance, control, transfer, and acceptance. It requires the investigation of current practice in New Zealand and overseas to identify appropriate incentives to improve 'whole of life resilience in the built environment'. It necessitates methods for placing an appropriate value on improved resilience or risk reduction that enable appropriate cost-benefit comparisons by building owners as well as at the community level.

Work underway includes:

- development of a business case for establishing a Local Government Risk Agency. The purpose of this agency is to provide comprehensive and consistent risk management expertise, knowledge and tools to local authorities across the country with an initial emphasis on natural hazard risk management for council assets.
- research (underway within the Natural Hazards Research Platform) to determine 'full-cost accounting' measures appropriate for deriving a more complete and accurate picture of the 'value' of resilience investments.
- scoping guidance for natural hazard risk led by the Ministry for the Environment.

Work to be scoped includes:

- review tax and accounting treatments, drawing on international best practice, that support resilience investment by the private sector
- facilitate and communicate a community-level approach to considering resilience decision making in the built environment that enables private costs and public benefits to be reconciled

Other actions included investigating incentives and barriers for investment in resilient buildings.

PUBLIC ENGAGEMENT AND COMMUNICATIONS

Actions

1. **Lift building owners' and occupants' understanding of hazards and resilience.**
2. **Improve community involvement when considering built environment hazard and risk management mechanisms.**
3. **Engage the public on levels of service expectations for infrastructure.**

Source: EQC

Commentary

The purpose of the built environment is to support human activity. People themselves can contribute substantially to built environment resilience when empowered to do so.

There is an increasing willingness for built environment providers to reveal risk exposures and potential loss of service. This is to be encouraged as all built environment assets and systems are vulnerable in some way.

There is a need to communicate effectively at the local community level as well as to the general public. Story telling to communicate risks to these end-users is one effective technique but technology is offering further opportunities (eg desktop virtualisation).

Communications need to be purposeful and strategic. There need to be clear goals and recognition of the associated risks. Political leadership is, at times, appropriate and necessary to deliver the right messages in a timely fashion.

INFORMATION: DATA AND EVIDENCE

Actions

1. **Develop the evidence required to inform improved governance and leadership, decision-making frameworks, incentives and tools, and public engagement and communication that lead to improvements in the resilience of the New Zealand's built environment.**
2. **Identify effective strengthening measures (in codes and guidance) within the built environment that deliver the most effective benefit-cost resilience gains.**
3. **Examine systems approaches to understand interdependencies within and among infrastructure services to improve understanding of the broader direct and indirect costs.**

Source: EQC

Commentary

We live in a digital age with the rapidly increasing ability to monitor activites, acquire data, undertake data analytics, crowd source data from mobile devices, and apply decision-making tools in real time. Each of these areas can and will develop rapidly, largely driven by the private sector and New Zealand's rapid adoption of international developments.

There is a golden opportunity for us to work even smarter in a number of areas such as more useful databases, increasing database interoperability and accessibility, improving the mapping of natural hazards, recording the condition of buildings and infrastructure, and collating geotechnical information into a national database. Challenges are likely to be keeping one step ahead of technology developments and achieving nationally consistent approaches. In this context, there are a number of initiatives that are helping to inform our way forward, for example, three Treasury-supported projects in the areas of:

- Smart Cities for efficient design and operation of urban processes
- shared data standards for building and infrastructure assets to facilitate better understanding of our assets and their management
- development of a National Geotechnical Database to facilitate the sharing of geotechnical data amongst users (led by MBIE).

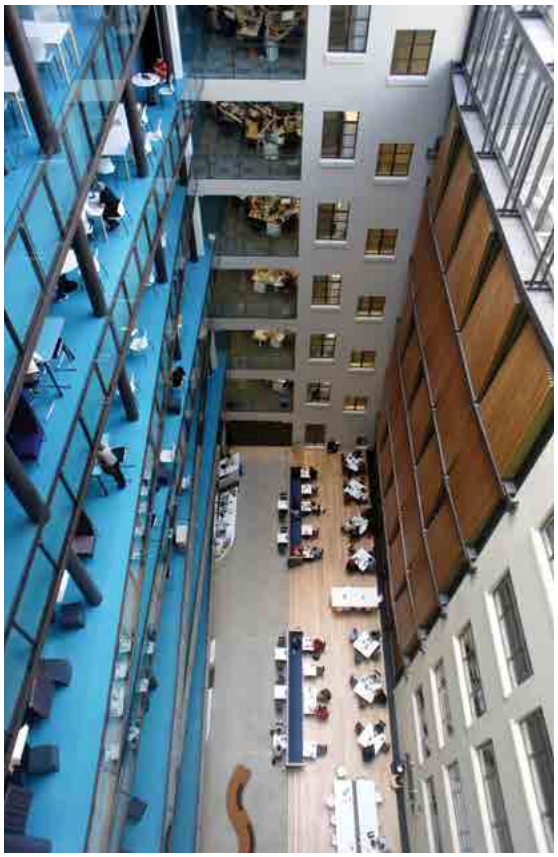
Other actions included improving the intelligence and understanding of how the various parts of the building system contribute to building resilience and the on-going maintenance of up-to-date hazard maps that influence land use planning for all regions. Enhanced professional development training for Councils, decision makers, land use planners, engineers and others on risk and resilience issues are expected to encourage greater collaboration on systemic issues.

GOING FORWARD

Actions

The Built Environment Leadership Steering Committee will:

- encourage incorporation of findings into current and future activities
- engage with stakeholders who will take the actions forward
- provide an enabling environment for new ideas and new participants
- maintain a visibility and presence for the Built Environment Leaders Forum working with aligned initiatives
- map built environment activities underway
- support relevant communities of interest
- actively engage with social agencies, cultural champions, and others who may not yet be well represented in the Built Environment Leaders Forum.



Source: Yasmin Merwood

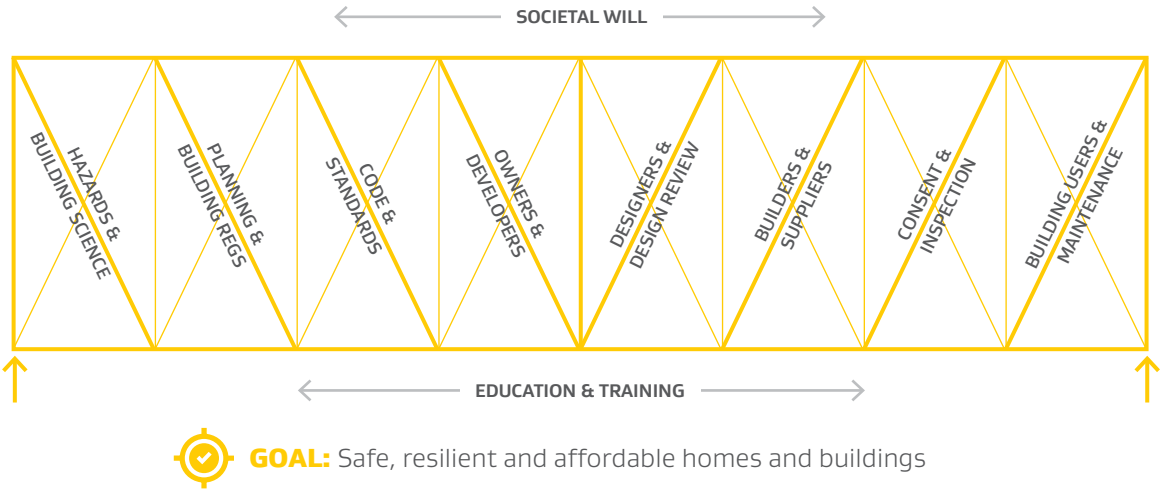
Commentary

Progress on these findings will be reported to stakeholders through the Built Environment Leadership Steering Committee. The Steering Committee and others will actively encourage actions from these findings to be effectively fed into other work programmes and related action plans.

The Built Environment Leaders Forum and this Summary of Findings represents a holistic approach to the current agenda around the housing stock, the building sector, and planning and building our towns and cities in a number of ways:

1. **It is more comprehensive and integrated.** It goes beyond the usual separate treatment of dwellings and neighbourhoods, towns and cities to recognise the connections between dwellings and urban environments and infrastructure. That separation has shaped policy settings, regulatory processes, and planning for many years.
2. **It focuses on how to revitalise and improve the built environment sector by including, but also going beyond, questions around productivity, innovation, and capability.** It also highlights questions about how to get legislation, planning and regulatory systems, and organisational processes to work together.
3. **It is concerned with how different stakeholders across central or local government, the building industry and its clients, designers, developers, or communities** can work effectively together to relate and engage productively with each other using a common language.
4. **It is charged with finding practical, proactive and integrated solutions** including how to:
   - optimise dwelling performance while achieving reduced building and operating costs
   - design and build dwellings and infrastructure that is adaptable and functional in a rapidly changing and increasingly diverse society.

INTEGRATED CONSTRUCTION SYSTEM



Source: Stannard 2015

The Built Environment Leaders Forum and this Summary of Findings is consistent with the Productivity Commission's call for a more holistic approach. It links strongly with the National Science Challenges 'Resilience to Nature's Challenges' and 'Building Better Homes, Towns and Cities', as well as QuakeCoRE. It builds on, but moves ahead of, current efforts by actively:

- framing the activities with living standards at the forefront
- liberating practitioners to work not only in cross-disciplinary teams, but teams that ask and deliver on new types of questions
- targeting effort to focus on the interdependencies and systemic issues
- taking an integrated approach to the building and construction system
- encouraging an active learning approach.

Source: Johnston

'The Built Environment Leaders Forum and this Summary of Findings is consistent with the Productivity Commission's call for a more holistic approach.'

Source: Aurecon

CONTACT DETAILS

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STEERING COMMITTEE PARTICIPANTS

New Zealand Lifelines Council

Earthquake Commission

BRANZ – Building Research Association of New Zealand

Building System Performance, Ministry of Business Innovation and Employment

Science, Skills and Innovation, Ministry of Business Innovation and Employment

Local Government New Zealand

Ministry of Civil Defence and Emergency Management

Ministry for the Environment

Department of the Prime Minister and Cabinet

New Zealand Treasury

Christchurch City Council

Wellington City Council

GNS Science

Resilience to Nature's Challenges Science Challenge

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Kestrel Group