



Levy in Action

Building Research Levy Investments 2015/16

Inspiring Better Buildings



Building Research Levy investment

\$12.4 million

At the core of BRANZ is the delivery of impartial and independent advice based on robust science and authoritative evidence



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Foreword

Our vision is inspiring the industry to provide better buildings for New Zealanders.



BRANZ has boosted Building Research Levy investments to \$12.4 million for 2015/16, an increase of just over \$2 million from 2014/15.

In our call for proposals through the Building Research Levy Prospectus 2015/16, we promised that we hoped to be able to invest up to \$11.5 million. I am delighted that we have been able to do better than that by nearly \$1 million.

These Levy investments support important education and training developments alongside significant new and on-going research.

The increase reflects our commitment to meet the continued demand for impartial and evidence based advice.

It also reflects the agility of BRANZ Inc to judiciously manage the fluctuations being experienced in Levy income.

These are times of unprecedented growth and demand for building and construction services in New Zealand. During this growth cycle, we see both opportunities and challenges.

We are consequently targeting three priority areas for action in what we do, including Levy investments. These three areas are:

- improving housing affordability
- improving and maintaining building quality
- improving building resilience.

Increasingly, our Levy investments for BRANZ-based multi-year work programmes and new external partnerships, will reflect close alignment to these priorities within the Industry Research Strategy.

BRANZ works hard to ensure our Levy stewardship role remains robust, transparent and wise. This publication outlines how we invest the Building Research Levy, the processes we apply, the advice we seek and the distribution of Levy funds across Industry Research themes in 2015/16.

The publication reflects our commitment to greater transparency of our Levy stewardship role and invites closer scrutiny of the Levy investments. Each project in receipt of Levy funds for 2015/16 is catalogued here and includes contact details for further information.

We invite you to engage with these important and exciting projects.

Chelydra Percy

Chief Executive Officer



Levy stewardship

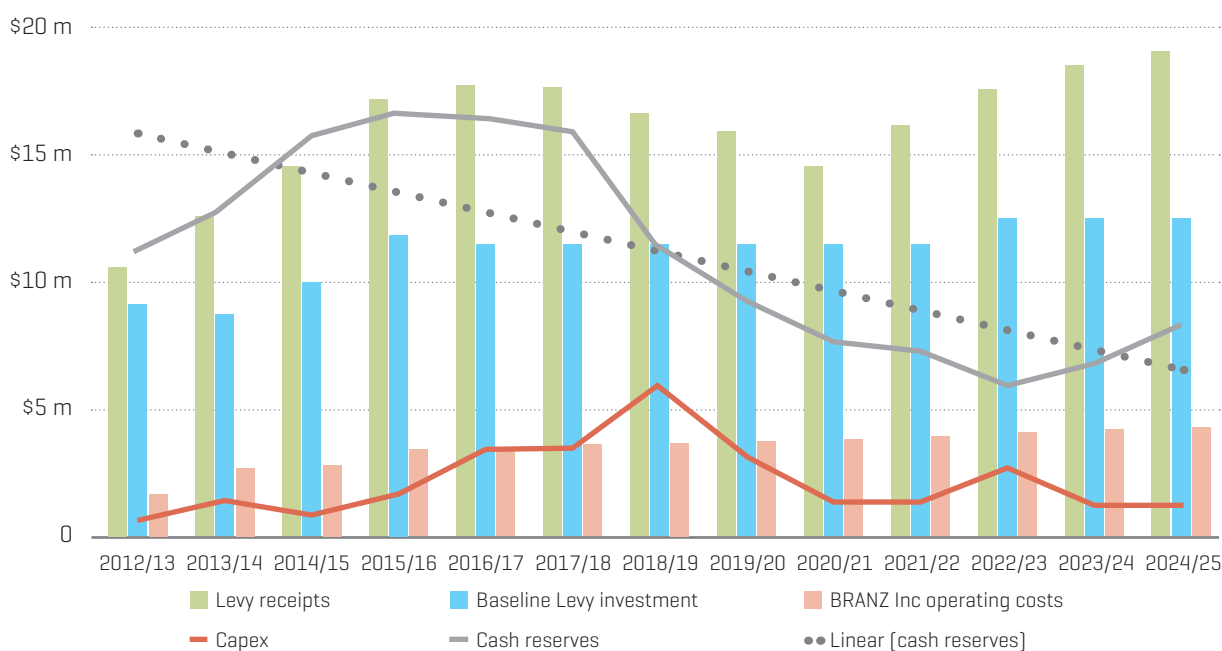
Ensuring the industry gets the greatest benefits possible from Levy investment.

BRANZ is committed to robust, transparent and wise management of the Building Research Levy.

In the past 10 years, Levy receipts have ranged between \$8.6 million to \$12.5 million per annum. To smooth the impact of such volatility, we implemented a long-term Levy utilisation policy this year. This ensures our investment in innovation and research can remain stable over any rolling 10-year period and sustain core capability, research and facilities through up and down cycles.

The long-term Levy utilisation policy is reviewed annually. BRANZ has increased the Levy investments in projects for 2015/16 as a result of this year's review.

BRANZ Inc. long-term Levy stewardship model





Our investment process

At the core of BRANZ is the delivery of impartial and independent advice based on robust science and authoritative evidence.

BRANZ Inc invests the Building Research Levy to deliver a wide range of research and knowledge dissemination activities. BRANZ is New Zealand's leading building research provider, directly employing around 100 staff. It has a core set of capabilities that the Building Research Levy utilises and helps to maintain.

To ensure all initiatives funded by the Building Research Levy are of a high quality and are subject to scrutiny, all proposals undergo a contestable process. This includes the use of independent assessors appointed by the BRANZ Inc Board to provide advice on funding proposals. This committee is made up of leaders and experts drawn from the Building Research Advisory Council and wider industry. In recognition of the strong connections between BRANZ's research, government regulatory and policy direction the building performance team of the Ministry of Building, Innovation and Employment (MBIE) also participates on the committee.

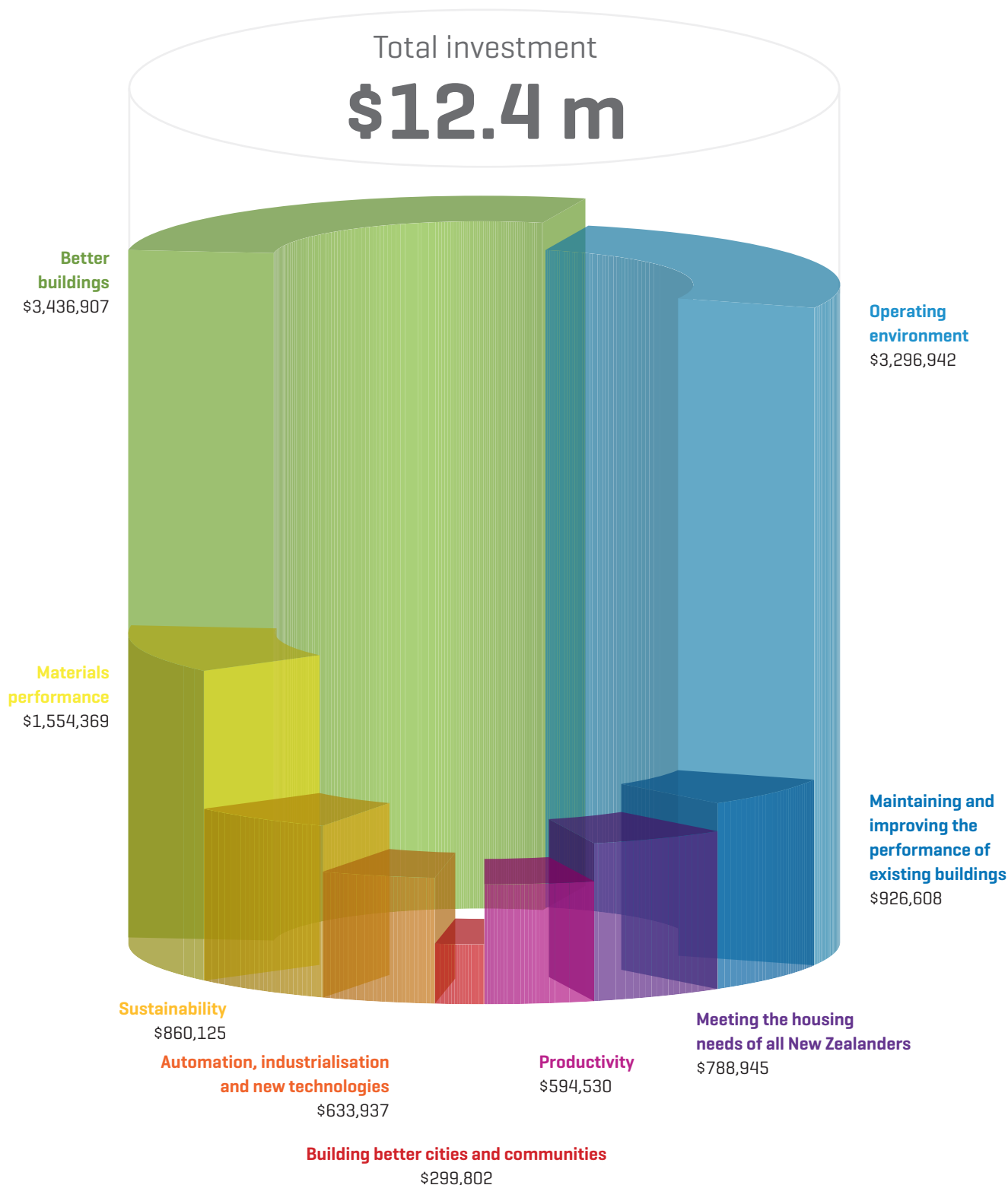
BRANZ also uses the Building Research Levy to invest in the extensive expertise within universities, Crown research institutes and independent research providers. Their skills complement BRANZ-based specialist teams and strengthen partnerships and collaboration with BRANZ that helps deliver the best value from the Levy for New Zealanders. External providers are invited to submit proposals that address priorities published in

an annual research prospectus. The prospectus distils these priorities from the Industry Research Strategy and biennial Industry Needs Survey. An assessment panel considers these proposals, drawing on help from industry experts.

In addition, younger scholars and early-stage researchers pursuing innovative research are targeted by BRANZ. Each year, BRANZ makes available \$250,000 for outstanding master's and doctorate scholars in New Zealand tertiary institutions. These scholarships are promoted through university research offices, and BRANZ is currently supporting a cohort of more than a dozen scholars.

Finally, whilst the majority of BRANZ's research investments are delivered through annual funding programmes, BRANZ retains the flexibility to invest out of cycle. This provides BRANZ with the ability to respond quickly to emerging industry issues and address urgent research needs. Out-of-cycle proposals are considered on an as required basis and initial approaches are directed to contact research@branz.org.nz.

Allocation overview



THIS REPRESENTS THE TOTAL LEVY INVESTMENTS MADE FOR THE 2015/16 FINANCIAL YEAR. IT INCLUDES NEW INVESTMENTS PLUS BUDGETED EXPENDITURE FOR EXISTING COMMITMENTS PLANNED DURING THIS 12 MONTH PERIOD. PLEASE NOTE, THE TOTAL AMOUNT IS SUBJECT TO CHANGE DUE TO PROJECT VARIATIONS THAT MAY OCCUR AND NEW OUT-OF-CYCLE INVESTMENTS THAT ARE MADE IN RESPONSE TO EMERGING ISSUES.



Levy investments

Summary of all current Levy investments, under the nine themes of the Building a Better New Zealand Research Strategy

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We do ground-breaking work that makes a difference. Sometimes it takes a long time for our investments to deliver gold.

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Better buildings

Buildings are fundamental to our way of life. They are the foundations of our economy and represent the majority of fixed assets in New Zealand.



Total investment in 2015/16

\$3,436,907

Improving the quality, function and performance of our buildings is a vital foundation for supporting New Zealand's economic growth.

Providing good-quality buildings, including housing, schools and workplaces, is important for all New Zealanders.

The research topics set out in the better buildings theme include:

- resilient buildings
- moisture in buildings
- indoor air quality and moisture control
- ventilation
- acoustic performance
- fire.

Deck details

This project addresses the industry's need for practical solutions and support for the construction of timber-framed slatted decks. A suite of 40 buildable details will be created on barriers, joists, decking junctions, piles, bracing, infill and handrails. A number of new details will be built and tested to AS/NZS 1170 *Structural design actions*. Take up of the guidance will lead to safer, better decks for New Zealanders.

Building Research Levy investment

\$145,000

Timeframe

Due to be completed by March 2016

Contact

Trevor Pringle
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Development of the WUFI tool

BRANZ will work with the designers of the Wärme Und Feuchte Instationär (WUFI) moisture movement simulation tool to develop several enhancements to the original model, based on New Zealand's needs. These include a fresh look at air movement in cavities and the implications of insulation becoming less air permeable. This project will improve industry proficiency at using WUFI as a moisture design and analysis tool. This will improve the industry's ability to model more difficult problems around building performance.

Building Research Levy investment

\$430,000

Timeframe

Due to be completed by March 2018

Contact

Steve McNeil
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Energy-efficient ventilation

Ventilation systems offered in New Zealand tend to over ventilate the building. This causes large energy losses in houses that are already struggling to maintain an acceptable winter indoor temperature. This project will develop two models to identify appropriate performance requirements for buildings that use ventilation systems and create new knowledge about the use and effectiveness of single-room systems. The project will also develop a web-based guidance tool to help designers select a suitable ventilation system given the history of a building.

Building Research Levy investment

\$400,000

Timeframe

Due to be completed by September 2018

Contact

Manfred Plagmann
manfred.plagmann@branz.co.nz

Indoor air-quality knowledge in New Zealand

Indoor air conditions and contaminants in buildings have significant health implications. This project will map the knowledge that exists about the indoor air quality of New Zealand homes. It will identify knowledge gaps and establish connections between researchers in New Zealand and overseas. It will also establish an approach on how to conduct a contaminant survey of New Zealand's housing stock.

Building Research Levy investment

\$80,000

Timeframe

Due to be completed by September 2016

Contact

Manfred Plagmann
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Interstitial moisture in roof cavities

This research will provide new information to inform a better understanding of moisture and ventilation in the roof cavities of New Zealand houses. It will inform the provision of software tools to improve the design and specification of roof structures. The use of such tools will ultimately help prevent excessive moisture in roof and potential damage to roofs and ceilings and improve building performance.

Building Research Levy investment

\$300,000

Timeframe

Due to be completed by October 2017

Contact

Stephan Rupp
stephan.rupp@branz.co.nz

Occupant behaviour – ventilation and temperature

The effectiveness of ventilation in residential buildings largely depends on the behaviour of the occupants. However, little is known about their habits of opening and closing doors and windows. This project is measuring ventilation, temperature and energy-use parameters in New Zealand homes. These are factors important to the health and wellbeing of building occupants. The research will provide up-to-date data to determine what temperature improvements have occurred within our houses over the last decade. It will also update the online Household Energy End-use Project (HEEP) temperature tool and model more effective and efficient use of ventilation systems.

Building Research Levy investment

\$430,000

Timeframe

Due to be completed by March 2018

Contact

Manfred Plagmann
manfred.plagmann@branz.co.nz

Passive fire protection guide

Passive fire protection is about how we design install, inspect, certify and maintain resilient joinery, building materials, sealants and related features. Evidence shows that passive fire protection is ineffective in a large proportion of non-residential buildings in New Zealand with little guidance available. This project will deliver a guidance document and education programme to improve passive fire protection and create safer buildings for New Zealanders.

Building Research Levy investment

\$115,000

Timeframe

Due to be completed by March 2017

Contact

Margaret McLachlan
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Reducing the effects of flooding

This project investigates the effects of flooding in New Zealand buildings. In particular, it is testing how different foundation systems, floors and claddings react to flood ingress, water egress and drying. Research findings will help designers and builders provide better advice on ways to make buildings more resilient. It will also enable building owners to make more informed decisions when upgrading their property and carrying out any post-flood drying and remediation work.

Building Research Levy investment
\$364,000

Timeframe
Due to be completed by March 2018

Contact
Patricia Shaw
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Removing contaminants from indoor air spaces

This project will explore alternative ventilation mechanisms to help provide healthy indoor air quality where ventilation alone is not a viable option. In particular, it will investigate the potential of ultraviolet light technologies. Such technology produces highly active radicals that neutralise airborne contaminants, such as allergens, mould spores, nitrous oxides and bacteria. This research will test the performance of ultraviolet light technology against contaminants found in New Zealand buildings.

Building Research Levy investment
\$80,000

Timeframe
Due to be completed by September 2016

Contact
Peter McDowall
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Updated Good Practice Guides

This project provides important and timely updates of three key industry resources:

- Good Practice Guide *Masonry Veneer* [2nd edition]
- Level Sustainability Series *Energy* [2nd edition]
- Level Sustainability Series *Windows* [2nd edition].

These guides raise standards and building practice to industry best. New energy technologies and developments around window systems are of particular importance given the volume of new homes being built.

Building Research Levy investment
\$235,000

Timeframe
Due to be completed by March 2016

Contact
Margaret McLachlan
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Weathertightness

This project represents the continuation of weathertightness research at BRANZ. It aims to improve the quality and weathertight performance of mid-rise buildings [3-10 storeys] to avoid a potential leaking building problem. It will provide design details that have been scientifically investigated for use by designers of mid-rise buildings. It will ensure other parties involved in their delivery, such as builders and councils, have access to information that allows them to address key areas of difficulty. In addition, BRANZ will help test new procedures appropriate to these buildings.

Building Research Levy investment
\$300,000

Timeframe
Due to be completed by March 2017

Contact
Greg Overton
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BRANZ scholarships

Julia Thompson, Victoria University, master's

Julia's research looks at how to design fresh air systems for spaces that cater for large audiences. The Opera House in Wellington has been selected as a case study for this research due to its impending seismic renovation as well as its original naturally ventilated design. This includes a sliding ceiling and sliding roof system. This case study project aims to understand the principles used in the design of the original natural ventilation and their performance in practice. As well as recovering lost knowledge, research in this area has the potential to create solutions to improve building performance during seismic retrofit of unreinforced masonry buildings, with the opportunity to also restore their functional heritage.

Phoebe Taptiklis, Massey University, PhD

Phoebe's project contributes to the on-going investigation into the contribution that small improvements to the housing stock make to reducing dampness and mould in New Zealand houses. This project builds on the work of the BRANZ House Condition Surveys and the research of the Household Injury Prevention Study. These respectively showed the poor condition of claddings and the contribution this has to dampness and poor health. This project aims to identify ways to reduce mould and dampness and hence improve the health of occupants and durability of the housing stock.

Existing projects continuing in 2015/16

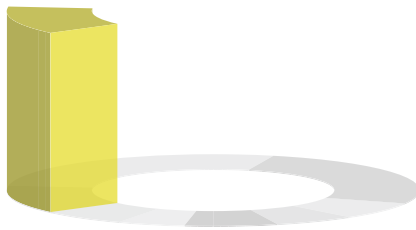
- Improving the resilience of non-structural building components
- New insight into building moisture and indoor environmental quality – the Weathertightness, Air quality and Ventilation Engineering (WAVE) programme
- Subfloors and roofs – moisture management, corrosion prevention, thermal performance
- Vapour controls in walls
- Simulating the airflow of a roof with detailed roof geometry
- Analysis of new housing – a national survey
- Non-residential rainwater and greywater feasibility
- Performance-based fire safety engineering – limiting fire spread by design
- Specific design for light timber-framed buildings
- Seismic response of buildings – cost/benefit of increased resilience
- BRANZ expert input to MBIE Engineering Advisory Group
- Revisions of NZS 3603:1993 *Timber structures standard*
- Sector performance – effectiveness of passive fire protection

Materials performance

Research into materials and their performance is an area that is consistently rated as an innovation priority.

We need to clearly understand how the materials used in our built environment perform, both as distinct products and as part of increasingly complex systems.

As the range of materials used in the built environment continues to change, the opportunities presented by investing in materials performance are significant. This applies both within New Zealand and for businesses looking at the export potential of their ideas.



Total investment in 2015/16

\$1,554,369

Understanding how materials will perform is an important foundation stone in helping underpin the development of innovative products that will meet the requirements of the New Zealand Building Code. This research area will strengthen New Zealand's ability to use materials more effectively.

Effects of humidity on gypsum plasterboard

New Zealand has significant numbers of 1–2-storey buildings constructed using light timber framing with gypsum plasterboard linings as the primary lateral load-resisting system. Past research has indicated that higher moisture levels can reduce the effectiveness of plasterboard as a structural component. However, there are no specific requirements in current testing methods for plasterboard regarding humidity conditions. This research will determine methods for evaluating moisture effects on plasterboard performance. This will then support recommendations for future versions of BRANZ's wall bracing test and evaluation procedure required for designs according to NZS 3604:2011 *Timber-framed buildings*.

Building Research Levy investment

\$108,225

Timeframe

Due to be completed by January 2016

Contact

David Carradine
david.carradine@branz.co.nz

Positional material deterioration over the building envelope

This research aims to better understand how materials perform in different environmental conditions according to construction location and position. Since building materials are estimated to make up around 30% of the overall cost of a new house, the right specification of durable but cost-effective materials is significant. The aim of this research is to improve the reliability of the specifications to which we build and provide input into the on-going revision of the New Zealand Building Code and standards. It will specifically look at how construction features create micro-environments and the deterioration behaviours of materials when exposed to these micro-environments. The research findings will be able to help better decision making when selecting appropriate construction materials.

Building Research Levy investment
\$475,000

Timeframe
Due to be completed by March 2019

Contact
Zhengwei Li
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Seismic joints for cross-laminated timber

Cross-laminated timber [CLT] is an engineered wood product that has gained increased interest within the construction industry for the last decade. Its properties, structural behaviour and sustainability has been well researched in Europe and North America. However, there has been limited research on the suitability of CLT within New Zealand given national seismic considerations. This project will research the technical and commercial suitability of CLT for the New Zealand building industry, primarily in respect of jointing for seismic applications. It will also provide design guidelines and standards to reduce the risk of potential problems in the future. This work underpins the current revision of NZS 3603:2011 *Timber structures standard*.

Building Research Levy investment
\$750,000

Timeframe
Due to be completed by March 2018

Contact
Patricia Shaw
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Structural adhesives

This project will improve our understanding of the changes that natural ageing causes in the chemistry of adhesives. It will develop accelerated ageing methods that mimic real-time changes in a predictable and reliable manner, focusing on the New Zealand Building Code's 50-year durability requirement. This can then be applied to provide a greater level of confidence in alternative adhesives for structural applications. Manufacturers and suppliers will consequently be able to offer new products for use in the New Zealand building industry that may contribute to better buildings and productivity gains.

Building Research Levy investment
\$465,000

Timeframe
Due to be completed by October 2018

Contact
Patricia Shaw
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Existing projects continuing in 2015/16

- Research around the performance of materials within geothermal environments
- Research into improving resilience – notably how materials and systems can be made more resilient
- Development of improved materials performance testing methodologies
- Research into floor slab perimeter insulation
- BRANZ PhD scholarship, University of Auckland – Gye Simkin
- BRANZ PhD scholarship, University of Canterbury – Audsley Jones
- BRANZ PhD scholarship, AUT – Van Tran
- BRANZ PhD scholarship, University of Canterbury – Samia Ali Tariq
- Maintenance and development of weathering sites located across New Zealand
- Development of a durability verification database

Maintaining and improving the performance of existing buildings

85% of the current building stock will still be with us in 2025.

It is immediately apparent that the existing building stock is a critical item in the nation's future. In a typical year, more buildings are renovated than are built, so existing stock is a key focus of building owners and the building industry.

The 2010 House Condition Survey [carried out every 5 years as part of a 20-year survey programme jointly funded by BRANZ and MBIE] found that:

- 41% of houses were in good condition and well maintained
- 59% of houses were in moderate or poor condition
- 25% of houses had defects that needed attention within 3 months.



Total investment in 2015/16

\$926,608

Whether making homes warmer and drier, improving the conditions of public buildings or upgrading commercial buildings, improving the performance of existing buildings is a key issue for many New Zealanders.

Good Repair Guides 2015/16

Good Repair Guides give practical advice on repairs and maintenance of New Zealand housing and low-rise buildings and are designed for less-experienced builders. Each guide explains common problems and gives comprehensive descriptions of how to repair them. The guides are succinct and easy to navigate and use text, illustrations and photographs to cater to a range of learning styles.

This work follows on from the success of the first series of guides published in 2014. To date, the following topics have been identified for the second series:

- Clay and concrete tiles
- Concrete floors
- Hinges
- Improving the quality of harvested rainwater
- Leaking basement walls
- Overlay floors
- Retrofitting wall insulation
- Stain removal
- Wall linings
- Wet area sheet linings.

Building Research Levy investment

\$235,000

Timeframe

Due to be completed by March 2016

Contact

Margaret McLachlan
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Existing projects continuing in 2015/16

- 2015 House Condition Survey
- Develop and test a framework for improved decision making about existing homes [renovate or retire] at the level of a neighbourhood development
- Effects of proprietary mechanised home ventilation systems [MHVS] on health

Sustainability

The building and construction industry is a significant source of economic growth and prosperity.

According to the United Nations Environment Programme, the building and construction industry accounts for 10% of the world's GDP and 7% of the world's jobs. However, to achieve this, the industry places high demands on the environment, being responsible globally for approximately:

- 40% of annual natural resource consumption
- 30% of energy consumption
- 30% of greenhouse gas emissions
- 25% of all timber use.



Total investment in 2015/16

\$860,125

In New Zealand, construction and demolition waste may represent up to 50% of all waste generated nationally. Commercial buildings account for around 9% of total energy use and 21% of New Zealand's electricity use, which costs New Zealand businesses around \$1.25 billion every year.

Although the industry has made good progress in recent times towards becoming more sustainable, we still face some significant challenges. Sustainability and the built environment is also an increasingly strong component of many countries' approaches to improving resilience to natural hazards and climate change.

BRANZ scholarships

Elzine Braasch, Victoria University, master's

Elzine's research looks at improving the thermal and daylight performance of commercial office buildings. During the early stages of design, passive design decisions that affect the energy performance of a building are often made based on a rule of thumb. This approach to design can lead to unwanted performance. The idea behind this research is to look at how simulation can improve design. Simulation could allow for the ability to assess the performance of the building specific to its location and function rather than relying upon assumptions that may be based upon different climate situations.

Ethan Duff, Victoria University, master's

Ethan's research will create a tool that will encourage the uptake of energy ratings in New Zealand's small commercial buildings below 3,000 m² [which make up over 95% of the building stock and 60% of the total floor area]. The research will explore the link between effective energy management and environmental quality. It will then apply this knowledge through the specification and design of an add-on to NABERSNZ [a system for rating energy efficiency of office buildings]. This will help assessors offer guidance and reassurance to clients that the full range of possible benefits can be achieved from implementing that guidance.

Existing projects continuing in 2015/16

- Environmental profiling
- Maintaining ALF 3.2
- Materials and characteristics of new buildings
- Measuring the value of sustainability and resilience features in housing
- Waste Management Fund timber and wallboards
- Construction waste REBRI accreditation
- BRANZ PhD scholarship, Massey University – Agneta Ghose
- BRANZ PhD scholarship, Massey University – Sally Coughlan
- BRANZ master's scholarship, Victoria University – Sara Wareing
- BRANZ master's scholarship, Victoria University – Victoria Toner
- On-going development and maintenance of the Level sustainability website.

Automation, industrialisation and new technologies

New technologies have the potential to significantly boost productivity.

New technology development is happening at an unprecedented pace. It is possible to see how the power of technology can be applied to the building and construction industry and transform the way it works.

There is an increasing need in the industry for improved familiarity and competence with advanced manufacturing processes, management, quality control and emergent technologies. These either support or disrupt the current methods and technologies in anticipation of improved productivity, improved quality, ease of use, control and other specific proprietary benefits.



Total investment in 2015/16

\$633,937

While the opportunities presented by new technologies are promising, the learning curve required to develop existing practices and capitalise on this promise is significant. An important component of this theme of Building a Better New Zealand is drawing on international experience and lessons. It is recognised that an important focus should be making the most of lessons learned in other countries. This approach can enable New Zealand to identify new approaches that could make a real difference if they could be applied in the domestic environment.

Assessing the value of traceability to New Zealand construction

This project investigates the benefits of being able to trace and rapidly identify construction materials in order to quantify the value traceability systems could provide to New Zealand. In particular, it will look at who would benefit from such systems – manufacturers, material suppliers, architects and designers, specifiers, builders, BCAs or building owners. It will also look at the traceability models and technologies existing in New Zealand and overseas. It will investigate why they were set up, how they operate, who they are for, what they cost and who benefits.

Building Research Levy investment
\$170,000

Timeframe

Due to be completed by December 2016

Contact

David Dowdell
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Development of the BRANZ 3D and 4D library

Architects, designers and, in particular, builders benefit from the visual demonstration of how the elements of a detail fit together. This project is to convert BRANZ two-dimensional details to 3D and 4D illustrations. Architects and designers will be able to include their own specifications and information onto generic 3D illustrations and 4D illustrations that will provide additional and educational information through describing construction sequences. Designers and specifiers will be able to import BRANZ details, with full functionality, into industry standard packages such as ArchiCAD, AutoCAD and Revit.

Building Research Levy investment
\$200,000

Timeframe

Due to be completed by March 2016

Contact

Margaret McLachlan
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High-value manufacturing in construction

This project will assemble a panel of experts – designers, machine distributors and product manufacturers – to introduce and accelerate the potential of computer numerically controlled (CNC) technology in the New Zealand construction industry. This technology, used in milling, routing and cutting machines, has the ability to change the way work is carried out – from design conception to manufactured output.

A construction industry strategy will be produced for innovation using high-value manufacturing machinery. It will consider issues such as skill availability and changes in training and expertise. In order to ground the strategy on industry practicalities, a number of key projects will act as test cases and learnings from these will be widely shared.

Building Research Levy investment

\$76,900

Timeframe

Due to be completed by March 2016

Contact

Dermott McMeel
d.mcmeel@auckland.ac.nz

Specific design for multi-storey light steel framed housing

The majority of multi-storey residential buildings in New Zealand have timber or concrete structural frames. Light steel framing is a potential alternative construction form. This project will develop the critical test data to inform the development of a design guide for buildings using the high-strength, light-gauge steel found in New Zealand. The research and design guide will extend the scope of the National Association of Steel Housing (NASH) Standard Part 1 (New Zealand Building Code) and forthcoming NASH Standard Part 2.

Building Research Levy investment

\$80,000

Timeframe

Due to be completed by July 2017
[The production of the design guide is a separate exercise outside the scope of this project.]

Contact

Stephen Hicks
stephen.hicks@hera.org.nz

Zero net energy schools

Achieving zero net energy [on average, no energy is used] in a building requires many different elements. It involves selecting the optimum mix of energy saving, storage and generation technologies based on the unique requirements and setting of the specific building. In return, it can provide benefits in terms of cost reduction as well as environmental and health gains.

This project will produce a comprehensive guideline on zero net energy buildings for non-expert decision makers such as a school board of trustees. An exemplar school site on Waiheke Island is acting as a demonstration building and will inform the guideline for wider application.

Building Research Levy investment

\$40,000

Timeframe

Due to be completed by June 2016

Contact

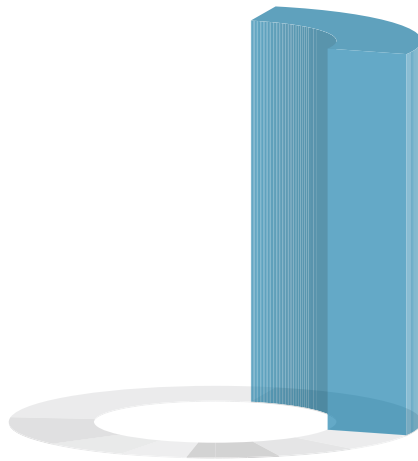
Mehdi Shahbazzpour
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Existing projects continuing in 2015/16

- Building façade thermal performance
- Levers for prefab action plan
- BRANZ PhD scholarship, University of Auckland – Yusef Patel
- Investment in the National BIM Initiative

Operating environment

An effective operating environment is essential to the industry's ability to thrive and contribute to New Zealand's prosperity.



Total investment in 2015/16

\$3,296,942

The operating environment is the external environment in which the building and construction industry operates and includes the regulatory environment (domestic and international) and the underlying economic conditions. The importance of an operating environment that provides optimal conditions for effective market participation and activity underpins many other aspects of research.

Acceptable construction industry resource

New consumer protection measures under the Building Act 2004 [the Building Amendment Act 2013] came into force in 2015. One of these measures is an automatic 12-month defect repair period within which building contractors are obliged to fix any notified defects – no questions asked. However, the interpretation of what constitutes a defect can be a significant cause of disputes between building contractors and clients.

This project will bring together all relevant information [such as Acceptable Solutions and standards, links to manufacturers' installation instructions] that defines acceptable construction and workmanship. It will cover a wide range of topics and be accessible, as a resource, in a highly visual way.

Building Research Levy investment

\$108,000

Timeframe

Due to be completed by January 2016

Contact

Margaret McLachlan
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B-RISK user support

B-RISK is a fire analysis software tool developed by BRANZ and currently used by most fire engineers in New Zealand. It provides a key analysis to demonstrate compliance with New Zealand Building Code requirements.

This project will review current B-RISK documentation and engage with B-RISK users to identify key upgrade areas. It will support at least three user workshops in Auckland, Wellington and Christchurch and include a series of online tutorials. The project will also target graduate students enrolled in the University of Canterbury's Master of Engineering fire programme to engage the next generation of fire engineers.

Building Research Levy investment

\$220,000

Timeframe

Due to be completed by March 2018

Contact

Margaret McLachlan
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Preparing clause H1 Energy efficiency

This project will help integrate thermal requirements of New Zealand Building Code clause H1 *Energy efficiency* with broader energy, ventilation and moisture performance metrics for residential buildings. It will be conducted in partnership with MBIE and be used to inform the next upgrade of clause H1.

The project will also deliver a dwelling design guide, co-branded with BRANZ and MBIE, to provide design solutions for a wide variety of building typologies.

Building Research Levy investment

\$435,000

Timeframe

Due to be completed by March 2017

Contact

Roman Jaques
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Seismic design of screwed timber joints

This project focuses on experimental investigation of screwed timber joints. Design methods being developed for inclusion in the phase 1 review are based on Eurocode 5 and the European Yield Method, including consideration of brittle failure modes. Neither are specifically applicable to seismic actions on timber structures. This aspect needs to be thoroughly investigated to ensure reliable performance of timber structures in New Zealand.

The results will inform the current NZS3603:1993 *Timber structures standard* review and provide greater knowledge of the loaded behaviours of timber screw connectors in New Zealand timber.

Building Research Levy investment

\$200,000

Timeframe

Due to be completed by April 2017

Contact

Roger Shelton
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Existing projects continuing in 2015/16

- Asbestos contaminated soils
- Work with MBIE on combustible ducting materials
- Contribution towards the Construction Strategy Group
- BRANZ PhD scholarship, University of Auckland – Brian Guo
- On-going publication of *Build* magazine
- Investment, alongside MBIE, in the development of a business case around a single, authoritative online portal for the building industry [BUGLE]
- Publication of *Guideline*
- Publication of *Bulletins*
- Publication of *Builder's Mate*
- Development and running of a number of industry seminars on key topical issues
- Delivery of the 0800 technical helpline
- Investment to provide expert input into the on-going development of the New Zealand Building Code and standards [above and beyond individual projects]
- Maintenance and development of the Building Industry Library



Productivity

Boosting productivity in the building and construction industry is of national importance.

Productivity is about how well people use resources to produce goods and services. When we talk about improving productivity, it is about creating more from available resources. These can be raw materials, labour, skills, capital equipment, land, intellectual property, managerial capability and financial capital. If we can improve productivity, we can have higher production, higher value and higher incomes. In general terms, the higher the productivity of a country, the higher the living standards it can afford.

When the Productivity Commission looked at the New Zealand building industry, it found that productivity growth is below that of other New Zealand industries. It also found it is below that of building industries in other countries. It noted wide-ranging concerns around issues facing the industry. These included projects exceeding budget and agreed timeframes, non-compliant or defective work and reliance on lower-quality materials, which have a shorter life span and require higher levels of maintenance. Lifting industry productivity will deliver important benefits to all New Zealand.



Total investment in 2015/16

\$594,530

Construction sector real productivity performance

This project will investigate ways of adding off-site production of components, such as prefabrication, into construction sector productivity statistics. Currently, these are included in manufacturing statistics. More robust and valid productivity statistics will enable a better understanding of the potential for off-site manufacturing to improve building and construction productivity in New Zealand.

Building Research Levy investment
\$35,000

Timeframe

Due to be completed by March 2016

Contact

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Improved government procurement of construction services

With tens of billions of dollars in government infrastructure spending planned over the next decade, the potential productivity, innovation and value gains for improved procurement are huge. Even a 1% improvement in the quality of the outcome or reduction in cost as a result of better procurement could mean \$200–400 million in savings or improved quality.

This project will investigate the appropriateness of different procurement models in different circumstances and their ability to balance competitive tension and quality whilst also providing better value for money. It will evaluate recent procurement processes (using Canterbury case studies) and develop a framework to guide best procurement options for a particular project.

Building Research Levy investment
\$115,000

Timeframe
Due to be completed by October 2015

Contact
Ian Page
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New laboratory to support ACRS

This project will see the establishment of a specialised laboratory for testing steel reinforcing bar and strand. The laboratory will be owned by Australasian Certification Authority for Reinforcing and Structural Steels (ACRS), managed by BRANZ and located at the BRANZ Wellington site. The two test rigs will provide New Zealand industry access to a valuable resource to help establish the product assurance of a range of pre- and post-stressing reinforcing products. This will help address current quality issues around imported reinforcing steel through the provision of specialised testing services for a JASANZ-accredited third-party product assurance provider.

Building Research Levy investment
\$15,000

Timeframe
Due to be completed by April 2016

Contact
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What builders need to tell their first-home buyers

This project aims to help builders and designers better meet the expectations of clients building for the first time. The BRANZ New House Owners' Satisfaction Survey shows very different scores received by builders building for a first-time client and those building for clients who have built before. This occurs even when using the same building company. The project will investigate why those differences exist and help identify:

- what builders need to do to meet their clients' expectations
- what builders need to tell their first-time clients (regarding time, cost and quality)
- what builders can improve to make new houses more liveable
- why there is a difference in scores received for builders building for first-time clients and clients that have built before.

Building Research Levy investment
\$110,000

Timeframe
Due to be completed by March 2016

Contact
Matthew Curtis
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Existing projects continuing in 2015/16

- Industry performance measures
- Productivity distribution and drivers of productivity growth in the construction industry
- The best and worst of buildings
- BRANZ PhD scholarship, University of Auckland – Johannes Dimyadi
- BRANZ PhD scholarship, Massey University – Wajiha Shahzad
- BRANZ PhD scholarship, University of Auckland – Garry Miller

Meeting the housing needs of all New Zealanders

As New Zealand's population grows and changes, so do our housing needs.

Statistics New Zealand forecasts that New Zealand's population will reach 5.5 million people by 2038. This growth is not expected to be distributed evenly amongst the regions – the populations of our cities are growing the fastest, particularly in the 'golden triangle' (Auckland, Tauranga, Hamilton). This will create particular pressures as housing markets change. Some areas will face higher demand that could exacerbate existing affordability problems, while others may see the housing market decline as population falls.

The Productivity Commission's report on housing affordability has emphasised how stability of the home environment is important for social cohesion and family stability. Real (inflation-adjusted) house prices in New Zealand are markedly higher than they were a decade ago. This has been associated with general declines in housing affordability and home ownership rates. These declines have contributed to increased demand for rental accommodation and additional pressure on the social housing sector.



Total investment in 2015/16

\$788,945

Community housing and the building industry

Due to changes in the rental sector, community housing organisations have increasing potential to be key providers of housing for vulnerable low-income households.

This research tests and establishes a system [or systems] for a collaborative procurement approach. Such an approach will involve the designer, engineer, planner, builder and community organisations and deliver better results for all participants at an affordable price.

Building Research Levy investment
\$95,000

Timeframe
Due to be completed by March 2016

Contact
Kay Saville-Smith
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Intermediate housing market

The intermediate housing market comprises private renter households with at least one person in paid employment but unable to purchase a home in the bottom 25% of house sale prices. The relative size of this market is an important indicator of first-home buyer affordability and it is a growing part of New Zealand society. Understanding why this is expanding will assist policy makers to be better able to meet the needs of this community. The research will examine trends using 2006 and 2013 Census data and provide insights into the range of factors influencing those trends.

Building Research Levy investment
\$57,500

Timeframe
Due to be completed by August 2015

Contact
Ian Mitchell
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BRANZ scholarships

Karen Henning-Hansen, Victoria University, PhD

Karen's research focuses on meeting the housing needs of New Zealand's ageing population. She is looking at how we can deliver better and more varied types of housing for an ageing population. She is focusing on sustainable models while addressing the need for increased urban density and infrastructural repurposing. In particular, she is looking at how better design could add value and create solutions.

Jade Kake, UNITEC, master,s

Many Māori families face difficulties attaining home ownership (and inter-generational equity), yet are unable to leverage their ownership interests in Māori land to secure home ownership. In addition, culturally appropriate housing that is sensitive to Māori whānau dynamics and responsive to the relationship Māori have with their whenua is scarce. Jade's research project aims to explore these complex issues to help better meet the housing needs of Māori.

Existing projects continuing in 2015/16

- Good homes for low-income tenants
- Accessible emergency egress
- CRESA downsizing project – finding the best fit

Building better cities and communities

Keeping pace with the demands of population growth.

When cities grow quickly, central and local government and business can struggle to build buildings and infrastructure that keep pace with the demands of population growth.

By contrast, in slow-growing and declining cities, the challenge can be just as difficult in dealing with replacement and on-going maintenance with stalled or falling tax revenues.

Cities are home for most New Zealanders. They are central to our quality of life and much of our economic and cultural innovation. As such, thriving, sustainable cities and settlements are integral to New Zealand's long-term wealth and wellbeing. New Zealand is a highly urbanised country, with approximately 87% of our population residing in urban areas.



Total investment in 2015/16

\$299,802

Over the next 20 years, it is forecast that three-quarters of new construction will be in Auckland and Christchurch. It is therefore critical that we improve our understanding of high-performing urban environments. These city buildings and spaces are increasingly important to our society and economy.

Delivering affordable accessible housing

Home ownership is decreasing, the rental market is increasing and new forms of residential accommodation such as homes on papakāinga land and retirement villages are emerging. This project will research three main questions:

- Can the building industry deliver affordable and accessible universal design housing in a variety of urban contexts?
- What changes in skills, market, product and regulatory conditions are required to improve the ability of the industry to deliver fit-for-purpose housing?
- How can the industry learn from its experience of building accessible housing and multi-unit and apartment dwellings?

The aim of the research will be to support the building industry to better provide affordability and accessibility to houses fit for purpose over the lifetime of their occupants.

Building Research Levy investment
\$67,000

Timeframe

Due to be completed by March 2016

Contact

Kay Saville-Smith
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Legal frameworks for multi-residential ownership

This research concentrates on the problems of ownership of multi-residential dwelling units on a single legal title and possible solutions for this.

Multi-residential development is growing in New Zealand. However, recent events such as weathertightness issues and the Canterbury earthquakes have highlighted shortcomings that need addressing. In particular, the multiple ownership models used in New Zealand such as cross-leases or unit titles can have serious deficiencies when multi-residential developments need to be repaired. Difficulties in repair or replacement can lead to lower capital values, depopulation and loss of amenity. If better models can be found, these issues can be avoided.

The project will identify problems through interviews with organisations and industry groups and conduct a literature search to identify potential ownership models. Proposed models will be tested with New Zealand stakeholders before final recommendations are then made.

Building Research Levy investment

\$50,000

Timeframe

Due to be completed by December 2016

Contact

Elizabeth Toomey
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Mixed-use urban planning and development

Auckland Council and other regional councils are attempting to address housing needs and improve city liveability by encouraging residential and commercial building types within the same development. This project will identify the characteristics of high-density, mixed-use developments.

It will explore the success [or otherwise] of such developments. It will identify the effects of travel behaviour on transport service options so this kind of building in New Zealand can be planned for more effectively.

Building Research Levy investment

\$60,000

Timeframe

Due to be completed by March 2016

Contact

Alan Nicholson
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Value uplift in New Zealand cities

Issues of low urban densities, infrastructure development and car dependency are proving difficult in New Zealand cities. This project will explore what New Zealand can learn from overseas experiences to tackle these issues. In particular, it will look at how other countries have used 'value uplift' to fund on-going infrastructure development. The results of this research will provide a robust evidence base on whether such overseas models would be appropriate to consider adopting in the New Zealand context.

Building Research Levy investment

\$95,500

Timeframe

Due to be completed by May 2016

Contact

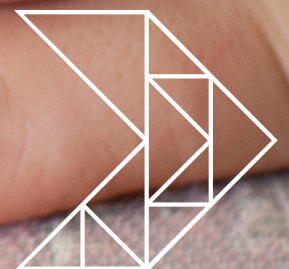
Malcolm Campbell
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Existing projects continuing in 2015/16

- SCIRT innovation project
- Novel hybrid damping devices and design techniques for damage-avoidance seismic response of high-density urban housing

If the only tool you have is
a hammer, you tend to see
every problem as a nail.

Abraham Maslow





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