

JULY 2018

2019-2024

# Strategy for Phase II

BUILDING BETTER  
HOMES, TOWNS  
AND CITIES

Ko Ngā wā Kainga hei  
whakamāhorahora

National  
**Science**  
Challenges



Cover Image: Hobsonville land development, Auckland, 2018. Reproduced with permission of the Hobsonville Land Company.

---

*Ehara taku toa i te toa takitahi,  
engari he toa takitini*

*'My strength is not that of alone but  
that of many.'*

# TABLE OF CONTENTS |

<b>Glossary</b>	<b>2</b>
<b>Glossary of Māori words</b>	<b>3</b>
<b>1. Long-term View</b>	<b>4</b>
<b>2. Five-Year Strategy</b>	<b>5</b>
2.1 Introduction	5
2.2 Strategy Framework	7
2.2.1 Structure of the research programme	8
2.3 Developing the Five-Year Strategy	11
2.3.1 Stakeholder engagement	11
2.3.2 BBHTC member meetings	12
2.3.3 Strategy alignment scan	13
2.3.4 Research landscape and gaps analysis	15
2.4 Strategic Research Domains	15
2.4.1 Overview of the two Strategic Research Domains	16
2.4.2 Domain integration and research objectives	19
2.4.3 Investment priorities	19
<b>3. Giving Effect to Vision Mātauranga Policy</b>	<b>21</b>
<b>4. Leveraging National and International Resources</b>	<b>22</b>
4.1 National Resources	22
4.2 International Resources	25
<b>5. Research, Science &amp; Technology Quality</b>	<b>27</b>
5.1 The “Best” Research Teams	27
5.1.1 A distinctive genesis	27
5.1.2 Best teams for Phase 2	27
5.2 Ensuring Research Quality	28
5.2.1 The Independent Science Advisory Panel	28
5.2.2 Quality assurance of research outputs	28
5.2.3 Investment and disinvestment	28
<b>6. Delivering Impact</b>	<b>30</b>
6.1 A Nimble Approach	30
6.2 Pathways to Impact	30
6.3 Benefits to Science and all New Zealanders	32
<b>7. Sound and Enduring Decision-Making and Accountability</b>	<b>33</b>
7.1 Governance	33
7.2 Effective Management	33
7.3 Challenge Governance and Management Structure	33
7.4 Supportive Host	35
7.5 Annual Budget	35
<b>8. Scenario Planning</b>	<b>36</b>
8.1 Research Collaboration with other NSCs	36
<b>9. References Cited</b>	<b>37</b>

## GLOSSARY |

TERM	DEFINITION/EXPLANATION
<b>Affordable Housing</b>	Housing that delivers affordable living to all including to lower income quartiles and those on 80% of median income.
<b>Affordable living</b>	Includes the costs associated with operating dwellings (heat, power etc, maintenance, adaptations etc) and using dwellings (typically travel associated with greenfields but also things like care costs resulting from inaccessible, poor functioning house designs or neighbourhood designs which disable people and prevent them from doing tasks that have to be undertaken by others)
<b>BBHTC</b>	Building Better Homes Towns and Cities: Ko ngā wā Kāinga hei Whakamāhorahora National Science Challenge
<b>Best Teams</b>	Multi-disciplinary teams that include researchers from across a range of disciplines that can work together in a collaborative and co-creative way to deliver both on the human and built environment elements of our research.
<b>BRANZ</b>	Building Research Association of New Zealand: BBHTC host organisation and with responsibility for hosting the Challenge Management Office, and providing business support for the Management Office and the Challenge Governance Group.
<b>HLC</b>	Hobsonville Land Company: A wholly-owned subsidiary of Housing New Zealand Corporation. HLC manages the development of integrated urban communities and housing development projects on under-utilised Government-owned land.
<b>Housing New Zealand (HNZ)</b>	Crown Agency responsible for supply and management of government funded social housing with a \$25.2B housing portfolio.
<b>Ministry of Transport (MoT)</b>	Government's principal transport agency including having responsibility for urban and regional transport infrastructure which are critical components of successful communities, towns, cities and regions.
<b>Ministry of Business, Innovation &amp; Employment (MBIE)</b>	Responsibilities include provision of advice on housing affordability, the built environment, residential tenancy and weathertightness and business, enterprise, sector and regional development policy and programmes.
<b>Ministry for the Environment (MfE)</b>	Responsibilities included facilitating cross-government interests in the housing, urban policy and environmental policy interface.
<b>Ministry for Social Development (MSD)</b>	Government's principal social agency, including having responsibility for working with people who need help with housing and social support.
<b>Regional towns and cities</b>	Second tier cities and towns, with populations of 10 000 to 400 000.
<b>Te Puni Kōkiri (TPK)</b>	Te Puni Kōkiri works within government and communities, to support Māori collective success. Te Puni Kōkiri Māori Housing Network supports individuals, whānau, hapū, iwi and rūpū with information, advice and practical support to improve and develop whānau housing.



## GLOSSARY OF MĀORI WORDS |

TERM	DEFINITION/EXPLANATION
Ahi kaa	Burning fires of occupation, continuous occupation
Ako	Knowledge exchange
Hapū	Sub-tribe
Hauora	Wellbeing
Iwi	Tribe
Kāinga	Home, address, residence, village, settlement, habitation, habitat, dwelling where all aspects of Māori wellbeing are nurtured
Kaupapa	Māori driven practise, approaches methodologies drawn from Māori epistemologies
Mā pango mā whero ka oti ai te mahi	<i>With red and black the work will be complete.</i> This proverb refers to co-operation where if everyone does their part, the work will be complete. The colours refer to the traditional kowhaiwhai patterns on the inside of the meeting houses.
Manaakitanga	Reciprocity
Manaaki tangata	Caring for people
Mana whenua	Territorial rights, power from the land, authority over land or territory, jurisdiction over land or territory - power associated with possession and occupation of tribal land
Marae	Meeting ground
Pā Kāinga	Village, settlement – that also includes people
Rangahau	Māori research
Rangatiratanga	Self-determination
Rohe	Tribal region
Tane Whakapiripiri	The trees of Tane, god of the forests, bound together
Tangata Tiriti	Non-Māori within the population
Tangata Whenua	People of the land
Whairawa	Wealth generation
Taura Here	Urban Māori kinship group
Whakawhanaungatanga	Making of connections
Whānau	Extended family
Wharehau	Tribal meeting house

## 1. LONG-TERM VIEW |

**What will success look like in the long-term in the areas of housing and urban development after the next five years of research funded by the Building Better Homes, Towns and Cities | Ko ngā wā Kāinga hei Whakamāhorahora National Science Challenge (BBHTC)?**

BBHTC's innovative research programme will contribute to ensuring that, on the occasion of the bicentenary of Te Tiriti o Waitangi in 2040, "housing shortages and homelessness" and "house prices and affordability" are no longer significant factors that negatively impact the life course and outcomes of all New Zealanders, as they are doing today (Morgan 2018). BBHTC research has the potential to influence the culture, practice and behaviour of householders, building owners, communities, the building and construction industry and policy regulators. Realising this potential will be achieved by widespread dissemination and discussion of evidence-based examples of how housing situations and livelihoods for families, whānau, kāinga, neighbourhoods, towns and cities are improving, via initiatives which empower people to improve their life chances in ways many are currently finding impossible.

By focusing investment in research that is co-created and co-produced with groups that are dealing directly with the problems of housing shortages, housing affordability, homelessness, urban and regional development, BBHTC will deliver on its gazetted objective, "to improve the quality and supply of housing and create smart and attractive urban environments". Intense engagement with decision-makers along with co-creation and co-production partners, will actively implement the solutions identified through Challenge research.

The success of the Challenge's ambitious research programme for the next five years will be demonstrated through industry, central and local government, and communities providing more

affordable housing and a more functional housing stock in more connected and liveable communities. To achieve this, they will be empowered by robust data, evidence-based tools, guidelines and best-practice examples to more effectively use existing housing as well as build new housing. A diverse range of interventions and approaches are required to simultaneously resolve the multiplicity of current problems in Aotearoa New Zealand's housing market, housing stock and its urban and provincial built environments. BBHTC's research framework, founded on the principles of whanaungatanga, manaakitanga, co-creation and collaboration, will continue to foster multi-faceted approaches to resolving key issues at a range of scales using multidisciplinary research teams drawn from several institutions, organisations and communities. Current Challenge research into housing in different urban and regional contexts shows that culturally appropriate housing solutions can address the complex dynamics of inequality, and the interplay of culture, social inequality and institutional power in Aotearoa New Zealand's contemporary economy and society. The Challenge will continue to exemplify how cultural knowledge, and solutions-building experience by Māori can not only address issues of Māori housing exclusion but can provide significant and transferrable solutions and approaches that can benefit other communities. Success will enable people and their communities to enrich lives and provide built environments that allow people to reach their social, cultural and economic potential in each life stage.



## 2. FIVE-YEAR STRATEGY |

### 2.1 INTRODUCTION

**The Building Better Homes, Towns and Cities | Ko ngā wā Kāinga hei Whakamāhorahora National Science Challenge (BBHTC) is tasked with using researchers' skills and imagination to provide evidence, ideas and solutions that can help key decisions makers and other stakeholders to "improve the quality and supply of housing and create smart and attractive urban environments" (MBIE 2017a: 14).**

It has this task at a time when inequality and exclusion in regard to housing are major concerns for politicians (O'Meara 2018), the public (Morgan 2018) and policy makers (Perry 2017). In addition, housing shortages and surging house prices in our biggest cities and some tourist towns have been generating significant affordability problems for both tenants and home buyers (MBIE 2017b; Murphy 2017a & b; Rae & Thompson 2017; Saville-Smith 2017a). At the same time, the building sector is struggling to achieve productivity standards that maintain profitability and deliver needed high-quality housing stock at affordable prices (Productivity Commission 2012; Page 2015; Saville-Smith et al. 2016).

Alongside these issues in housing, are deepening public and policy concerns about the performance of urban areas in all our regions, including Auckland, and their ability to meet the current needs, and future demands and expectations of their ageing, diversifying and often dispersed communities (Brabyn 2017; Jackson & Brabyn 2017; McKay & Perkins 2017). While access to affordable housing is crucial to the well-being of community, so too is the provision of places in towns and cities, and economic and social infrastructure and amenities, that enable and encourage people to connect, interact, express their identity, live well and thrive (Wane 2018). This is not possible if people are living in places that are under-performing economically and are under-developed socially, culturally and

environmentally.

Aotearoa New Zealand is not alone in facing challenges in regard to affordable housing and the ability of urban settlements to meet the current needs and expectations of their communities. There is an extensive international literature on these issues, some of which is summarised in Florida's (2017) recent book on what he terms "the new urban crisis". However, prescriptions for transformation generated out of overseas experience do not necessarily apply in Aotearoa New Zealand given some distinctive features of the country's settler colonial heritage, cultural diversity, building materials and design, and institutional and legislative frameworks.

From the outset BBHTC's research has been grounded in principles drawn from two distinctive knowledge systems – mātauranga Māori and western science (including the social sciences). A distinctive framework termed Tane Whakapiripiri (the trees of Tane, god of the forests, bound together) was adopted to bring together researchers working in both these knowledge systems to achieve the Challenge's mission "to deliver homes and communities that are hospitable, productive and protective". The Tane Whakapiripiri framework was depicted as a Māori meeting house (wharenuī), a place where people gather and connect, acknowledging the primary importance of dwellings for human wellbeing in any settlement and rohe context.

The first phase of the Challenge's research mapped out the broad terrain and complex dynamics that shape access to homes, the performance of homes, neighbourhoods, towns cities, and regions and how the benefits and burdens of our built environments are distributed (see 2017/18 Annual Report). It is becoming very clear from the preliminary findings of much of the research that BBHTC has contracted over the past 18 months, that accessing dwellings that can become "homes" for any length of time is becoming increasingly difficult for many New

Zealanders, especially those on incomes below the national median which is around NZ\$41,000. Heavily represented in this latter group are Māori and Pacific peoples.

In Phase 2 of BBHTC one of the main priorities for investment will be research that contributes evidence, ideas and solutions that have the potential to deliver positive outcomes in the short, medium and long-term in housing for Māori in different settlement and rohe contexts. This is essential if the Challenge is to deliver on its long-term view of what success looks like by 2040 when “housing shortages and homelessness” and “house prices and affordability” will no longer be significant factors that negatively impact the life course and outcomes of New Zealanders. The basic assumption is that if innovative research, rooted in mātauranga Māori or in western science, and both can contribute to delivering positive outcomes for Māori in different settlement and rohe contexts, then it is likely that all New Zealanders will benefit from the findings.

Supporting this strong investment signal is a shift from the metaphor of a meeting place where people gather and connect, Tane Whakapiripiri, to a metaphor of a community, Pā Kāinga, within which a meeting house is a central component. A building used as a residence means little on its own without reference to other buildings and social amenities in the vicinity as well as without reference to the people that inhabit the building and its neighbours. The concept of kāinga carries with it powerful embedded relationships between both the buildings and the inhabitants. Relationships produced through whakawhanaungatanga, manaakitanga, collaboration and co-production are central to BBHTC’s inclusive research strategy for the period 2019-2024.

In Phase 2, the Challenge’s research projects will address two broad questions:

- (a) how homes and the spaces that work for people can be delivered for all communities and generations, now and into the future, and
- (b) how urban communities, and the regions within

which they are located, can be supported to deliver homes, kāinga and neighbourhoods that are hospitable, productive and protective.

This focus has resulted from recognition that homes, kāinga and neighbourhoods, in their different regional settings, provide practical nodes of action to which the diverse array of stakeholders - industry, local and central government, individuals, households and communities, along with tangata whenua - can contribute.

The Challenge’s research will assist those involved in decisions affecting homes, towns and cities, in their regional and rohe contexts, to identify:

- where and how we need to depart from current building, housing and regional approaches and systems, and
- how homes, kāinga, neighbourhoods, towns and cities can be adapted and developed to meet the demands and expectations that the future will bring.

The Challenge’s research success will be reflected in:

- an expansion of affordable housing through effective planning and governance of housing, building and settlements;
- better integration of settlement design, amenities and infrastructure with the production, delivery and retention of affordable housing;
- better connected and serviced kāinga, neighbourhoods, towns and cities;
- strength based partnerships with Iwi, hapū, marae and Māori communities to build on Māori housing models of success;
- an appetite for, and ability to, manage settlement change in regions and rohe in ways that take account of:
  - ♦ de-population and re-population dynamics;
  - ♦ the need to realise the longevity dividend associated with structural ageing among Pākehā and the potential demographic dividend associated with the younger population structures of Māori and Pacific peoples;



- ♦ the value of affordable, functional housing, kāinga and neighbourhoods in stimulating local economies, contributing to diversity, cultural enrichment and social engagement.

## 2.2 STRATEGY FRAMEWORK

The vision, mission, objective and internal values for the Challenge remain unchanged. This is logical given the short history of BBHTC research (18 months) and the fact that the gazetted objective for the Challenge is fixed. These key elements of the strategic framework are summarised below to provide the context for the sections that follow on the process for developing the Phase 2 strategy and the key components of the proposed research for the next five years.

### TE TEKOTEKO | VISION

Built environments that build communities | Mā pango mā whero ka oti ai te mahi

Homes, neighbourhoods, kāinga, towns, communities and cities throughout Aotearoa New Zealand that enable people to enrich their lives and reach their social, cultural and economic potential throughout their lives.

### TE TAHUHU | MISSION

Through co-created, innovative research | rangahau, the Building Better Homes, Towns and Cities | Ko Ngā Wā Kāinga Hei Whakamāhorahora NSC will contribute to transforming the systems and organisations that shape-built environments, to deliver homes and communities that are hospitable, productive, and protective.

### WHĀINGA | OBJECTIVE

BBHTC will improve the quality and supply of housing and create smart and attractive urban environments by addressing themes listed in the Gazette Notice: Improved housing stock; meeting future demand for affordable housing; vibrant communities and cities for residents and

businesses; uptake of innovation and productivity improvements; and future land information systems.

## WHANONGA PONO | INTERNAL VALUES

As noted in section 2.1, BBHTC's research programme is grounded in principles drawn from two knowledge systems – mātauranga Māori and western science. The following key values, that are embedded in Te Ao Māori | the Māori world, are particularly relevant for the framing of the Challenge's research in the wider context of the four "wellbeings" that are being prioritised by the New Zealand Treasury for investment in the development of New Zealand's society, culture, economy and environment and that were recently reintroduced into the Local Government Act:

- Whanaungatanga – enabling social interaction (aligned with social and cultural wellbeing)
- Kaitiakitanga – connecting people to the natural environment (aligned with environmental wellbeing)
- Ūkaipōtanga – meeting the needs of diverse peoples (aligned with social and cultural wellbeing)
- Wahi manaakitanga – helping people to be healthier and safer (aligned with social wellbeing)
- Whairawa – supporting equitable access to wealth, resources and amenities (aligned with good internal systems and processes for sharing Challenge resources)

Through conscious recognition of these values in the design, management and implementation of research, BBHTC brings together Tangata Whenua (Māori) and Tangata Tiriti (others in the population) in a respectful research partnership, stakeholders and researchers in active engagement, and researchers collaborating across organisations and disciplines. A quarter of the 120 members of research teams currently funded by the Challenge are Māori, and across the various projects researchers bring skills and expertise from more than 80 academic and professional disciplines.

## 2.2.1 STRUCTURE OF THE RESEARCH PROGRAMME

The initial research programme that was approved by the Science Board in November 2015 was structured around six Strategic Research Areas (SRAs) which, after some review and revision, were labelled:

1. Kāinga tahi, kāinga rua
2. Shaping places: future neighbourhoods
3. Supporting success in regional settlements
4. Transforming the building industry
5. Next generation information for improved outcomes
6. Understanding the architecture and logic of decision-making.

The scale of the research that is being carried out under these SRAs ranges from the specific locality to the nation. This dimension of the SRAs can be summarised as follows:

1. The primary focus of research in the Kāinga tahi, kāinga rua SRA is at the level of the urban marae, the papakāinga and the kāinga in both major and minor urban area contexts.
2. Research in the Shaping places: future neighbourhoods SRA has focussed on the development and redevelopment of urban neighbourhoods in Auckland, Wellington and Christchurch.
3. The Supporting success in regional settlements SRA has been exploring drivers of change in the economies and societies of small- and medium-sized towns on the east coast of the South Island and in the central North Island.
4. The Transforming the building industry SRA was funded for 12 months and during that time produced a “state of knowledge” report on four drivers of change in the industry (innovation, technology, people and process).
5. The Next generation information for improved outcomes SRA has focussed on developing tools that enable more effective use of all kinds of digital information, including that generated by

social media, in housing development and urban planning and modernising the cadastral system to better accommodate multiply owned land.

6. The Understanding the architecture and logics of decision making SRA has identified and examined the complex mix of actors involved in decisions affecting affordable housing and the motivations, logics and tools those actors use in making their decisions.

In addition to research supported by the SRAs, there are 20 projects funded through a separate contestable process in 2017 that have been aligned with the SRAs. These are shown in white in Figure 1.

### BBHTC research strategy during Phase 1

During Phase 1, the Challenge’s research programme was deliberately broad in order to ensure that:

- key dynamics and critical elements would be illuminated;
- emerging issues or significant research gaps would be identified;
- change and any necessary re-framing would be facilitated;
- Collaboration and co-creation across SRAs would be enabled.

In addition to generating wide-ranging research contributions that are detailed in the BBHTC Annual Report for 2017/18, Phase 1 has:

- fostered skills in collaboration and co-production of research;
- created new synergies between researchers;
- actively engaged stakeholders and end-users;

Through these developments, a secure research platform of relationships and analytical capability has been created which can drive the BBHTC transformational research agenda forward.

### Framework for the research programme in Phase 2

Following extensive consultation and a wide-ranging review of the recent research landscape in the housing and urban development areas, a decision has been taken to restructure the research programme.



## OVERVIEW OF STRATEGIC RESEARCH PROGRAMMES

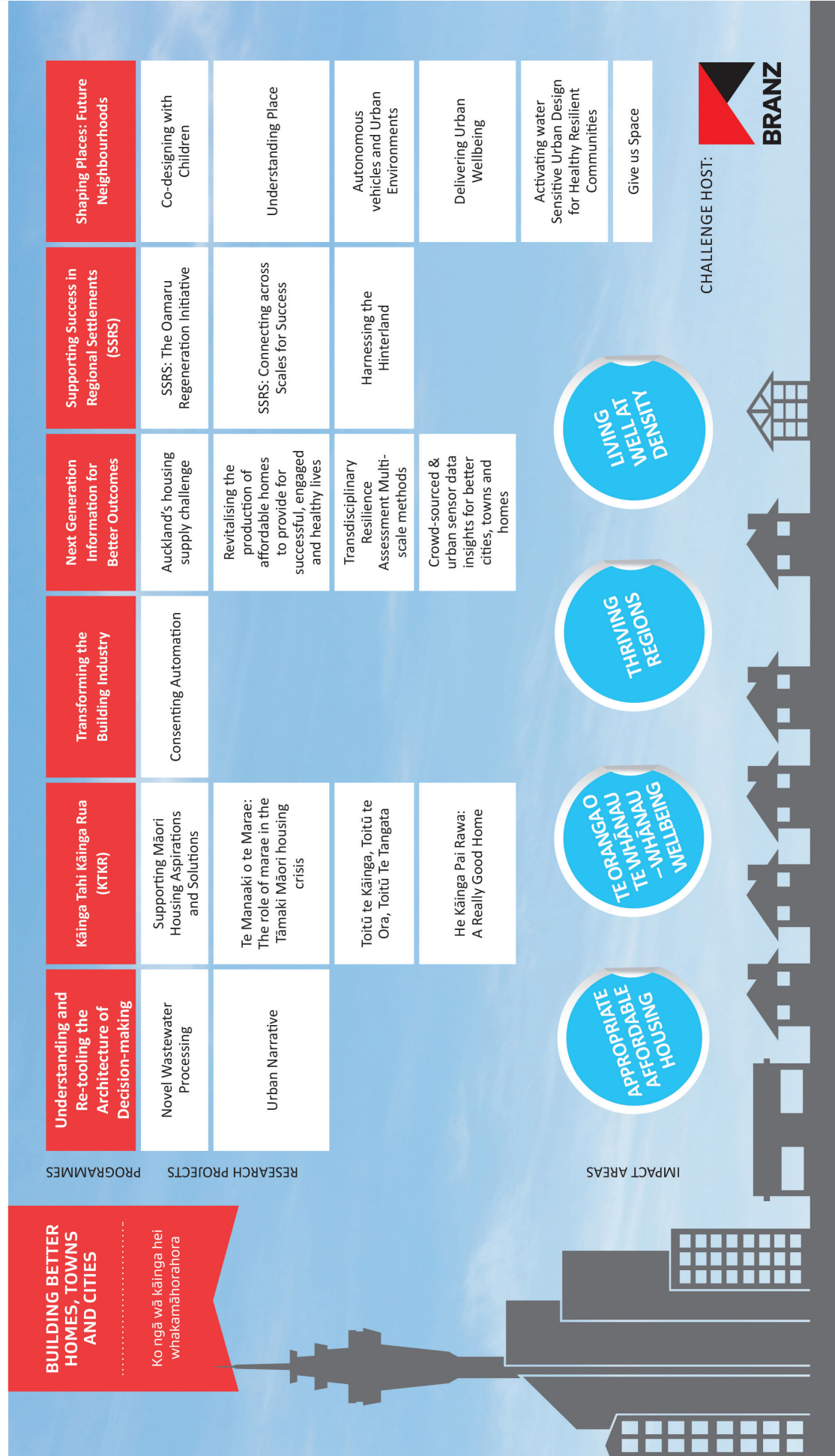


Figure 1: BBHTC's six Strategic Research Areas and research projects

For the second phase of funding, investment will be focussed on research addressing two questions:

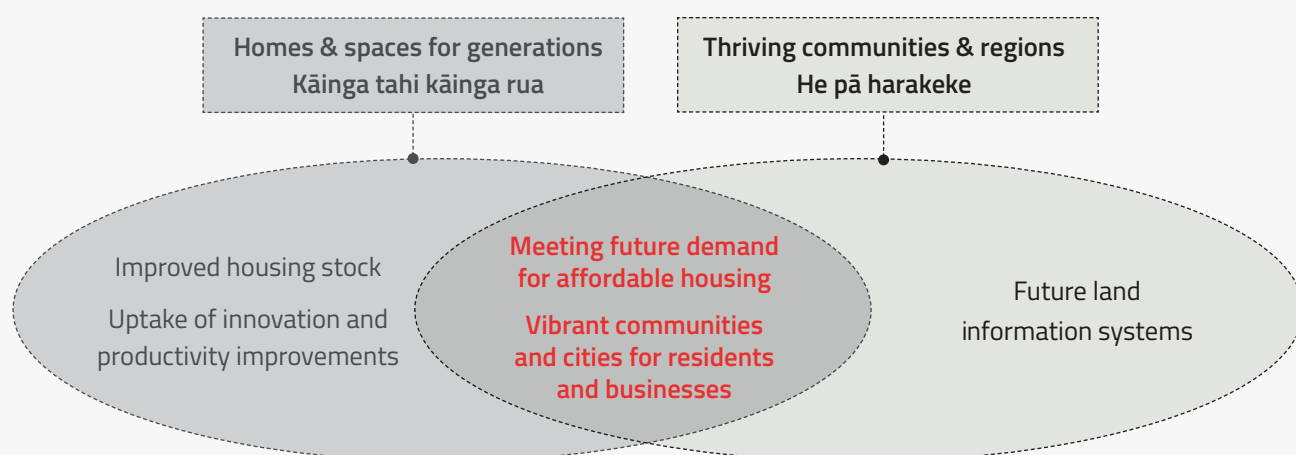
- how homes and the spaces that work for people can be delivered for all communities and for generations, now and into the future, and
- how urban communities, and the regions within which they are located, can be supported to deliver homes, kāinga and neighbourhoods that are hospitable, productive and protective.

These two questions underpin two new Strategic Research Domains that replace the previous six Key Strategic Research Areas. The relationships between the Strategic Research Domains (shown as ellipses) and the themes associated with the Challenge's gazetted objective (text within the ellipses) are shown in Figure 2.

By focusing research on two related "mega-issues" the BBHTC story is simplified and an environment that encourages a culture of collaboration and

co-creation is enhanced. The Governance Group, Directorate and Challenge researchers have observed that the six Strategic Research Area structure added unnecessary complexity to collaboration across teams and created opportunity for silos to form. In addition, it was difficult for the communications team and the media to present clear and concise messages about the Challenge and its research when its projects were covering such a wide range of scales and diverse areas.

There is also a pragmatic financial reason for the reduction in areas of focus. The funding available to support BBHTC's research projects during the three years between July 2016-June 2019 was just over \$20 million. Over the five years between July 2019-June 2024 there will be \$16.5 million available to support research projects (see section 7.5). This funding envelop will allow for, at most, two large-scale multi-disciplinary, multi-institution, multi-



THEMES	OUTCOME STATEMENTS	STRATEGIC RESEARCH DOMAINS
Improved housing stock	Houses are of better quality and are cost-effective	<ul style="list-style-type: none"> <li>Homes and Spaces for Generations</li> </ul>
Meeting future demand for affordable housing	New, affordable housing is developed and located to match current and future demand of different demographic groups	<ul style="list-style-type: none"> <li>Homes and Spaces for Generations</li> <li>Thriving communities and regions</li> </ul>
Vibrant communities and cities for residents and businesses	Better current and future urban environments encourage economic activity and improve residents' well-being	<ul style="list-style-type: none"> <li>Thriving communities and regions</li> <li>Homes and Spaces for Generations</li> </ul>
Uptake of innovation and productivity improvements	The building sector adopts innovation and techniques to improve productivity	<ul style="list-style-type: none"> <li>Homes and Spaces for Generations</li> </ul>
Future land information systems	Better systems make for improved land-use decisions	<ul style="list-style-type: none"> <li>Thriving communities and regions</li> </ul>

**Figure 2: Strategic Research Domains, Gazetted Themes and Outcome Statements**

year research programmes to be funded at around \$1 million per annum each, and a small number of more focussed, short-term projects to be funded totalling around \$500,000 per year. This compares with six large-scale research programmes funded at \$2.5 million each over 2.5–3 years and 19 smaller projects which received around \$2.5 million over 1.5–2 years.

The Challenge is seeking some additional funding to support three potential cross-Challenge collaborations between 2019 and 2024 (see section 8) but the core budget available in the initial funding allocation for National Science Challenges will have to be spread more thinly over a smaller number of programmes and projects in Phase 2 because of the longer investment period.

## 2.3 DEVELOPING THE FIVE-YEAR STRATEGY

The process for developing the five-year strategy builds on the culture of collaboration and co-creation that BBHTC has developed over the past two years. Through engagement and consultation, the Challenge Directorate and Science Leadership Teams have sought to further strengthen cohesion within the BBHTC community of researchers, and build strong relationships with partners in kāinga, neighbourhoods and communities, and with end users. Whanaungatanga and manaakitanga, two of the Challenge's guiding internal values, have been at the forefront of the strategy development process.

In this section we address our strategy development process with reference to:

- stakeholders;
- BBHTC members;
- a national strategy alignment scan;
- research landscaping and gap analysis.

### 2.3.1 STAKEHOLDER ENGAGEMENT

Stakeholder engagement in the development of this strategy has occurred at multiple levels. These include discussions between stakeholders and members of the Challenge-sponsored research

teams, open workshops for stakeholders, focus group-type meetings with members of key implementation agencies, a strategy day at a Research Colloquium in May 2018 and solicited written feedback via the Challenge's website. Around 30 submissions were received and a summary of this feedback is available on the Challenge website (<http://www.buildingbetter.nz>).

Through these processes several consistent priorities have emerged. These include: quality affordable housing; homes and associated spaces that allow residents with diverse needs and aspirations to live well now and in the future; community partnerships in any processes of change and transition to higher levels of economic, social, cultural and environmental wellbeing.

Government agencies with responsibility for delivery of social housing, transport and urban policy have been significantly impacted by the change in government and its policy priorities. These agencies are key implementation partners for the translation of Challenge research into policy and improved outcomes for all New Zealanders. The Challenge Director and senior representatives of these agencies have commenced a process to develop a deeper understanding of how the Challenge aligns with departmental needs and how productive working relationships can be sustained throughout Phase 2. This process has already led to Housing New Zealand deciding to develop a research strategy, which they do not currently have, and an invitation from the Ministry of Transport to partner in a transport knowledge conference in November 2018.

The Government's recent decision to create a new Ministry of Housing and Urban Development (O'Meara 2018) is a major new development that will impact on the Challenge's research agenda. Members of the Governance Group and the Challenge Director and Director Māori met with the Minister of Housing, Hon Phil Twyford on 12 July to discuss ways the Challenge can add real value to the Government's clear agenda to reduce housing shortages and address some dimensions of housing affordability for middle-income New Zealanders.



The Prime Minister has acknowledged that the widely publicised Kiwibuild state-subsidized housing programme is not going to address the problem of affordable housing for low-income New Zealanders (O'Meara 2018). It is in this latter space that BBHTC has an opportunity to prioritise research investment, especially with regard to innovative, solutions-focused research to address Māori housing needs and the needs of other groups seeking access to low-cost housing – Pasifika, refugees and some groups in the majority Pākehā population who are concentrated in low-wage employment.

The major interactions over the development of the strategy with Government agencies that are important stakeholders in the Challenge are listed in Table 1.

**Table 1: Meetings with Government agencies**

DATE/S	ORGANISATION
April 2018	Te Puni Kōkiri
April, May, June 2018	Ministry of Transport
May 2018	Housing NZ
May 2018	Ministry of Business, Employment & Innovation
June 2018	Ministry for the Environment
July 2018	Ministry of Business, Innovation and Employment

Other major groups of stakeholders and endusers include: Territorial Local Authorities, community housing and development agencies, Māori communities and authorities, industry organisations and companies.

In January 2018 the Director Māori organized a Māori housing Think Tank which was attended by a range of Iwi representatives, policy makers, territorial authorities, Governance Group members, both Directors as well as the Challenge's Māori

researchers. The Think Tank identified major priorities for Māori research and set in place key Māori stakeholder relationships that are now fully connected with Challenge activities. It also led to the development of the research projects that underpin the Kāinga Tahi Kāinga Rua Strategic Research Area.

As part of the process of developing and implementing their research projects, Challenge researchers have formed close relationships with planners and policy makers in at least 10 Territorial Authorities, including Auckland and Christchurch City Councils, as well as local authorities in Bay of Plenty, Waikato, Nelson/Marlborough, Canterbury and Otago regions. Along with members from these Councils, a range of community housing providers, including Community Housing Aotearoa, Abbeyfield Housing Sub-Committee, Marlborough Sustainable Housing Trust, the Hobsonville Land Company, and the Māori Housing Forum have been consulted about the future research priorities for the Challenge.

Engagement has also occurred with members of some industry-related groups such as PrefabNZ, Mike Greer Homes, LifeMark, and the Eco-Design Adviser Network. There are gaps in the consultation with industry as a result of the decision not to continue investing in the Transforming the building industry SRA late in 2017. This gap will be plugged as the Phase 2 research programme is developed and implemented.

### 2.3.2 BBHTC MEMBER MEETINGS

Four formal meetings involving members of the research teams, the Governance Group and the Directorate were held between November 2017 and June 2018 as part of the strategy development process (Table 2). In addition, there were numerous less formal internal discussions between Directors and the Science leadership teams, as well as between the Directors and the Governance Group.

**Table 2: BBHTC Internal Meetings**

<b>Nov 2017</b>	BBHTC Facilitated Workshop	Governance Group members, directorate members, members of the Science Leadership Team and the Māori Science Leadership Team
<b>Feb 2018</b>	BBHTC Māori strategy hui	Governance Group members, Directors, Māori Science Leadership Team, Māori researchers
<b>May 2018</b>	BBHTC Colloquium Day 2	BBHTC researchers, the Governance Group, Directors, overseas member of the Independent Science Advisory Group and MBIE officials
<b>June 2018</b>	BBHTC Senior researchers	BBHTC senior researchers, Directors, Māori Science Leadership Team, Science Leadership Team, Governance Group Chair

Members of the Science Leadership Teams contributed to the development of two strategy scoping documents. The first (Tranche 2 Strategy) was workshopped by the 100 participants in the Challenge's Research Colloquium on 9 and 10 May. The second (Revised Tranche 2 Strategy) was circulated in late May and discussed at Challenge workshops for researchers and stakeholders and endusers in Auckland (20 June), Wellington (22 June) and Christchurch (25 June). There was also a web-based feedback form for researchers and others to use for responses to a set of questions about the proposed priority research areas, how the Challenge's research priorities could leverage opportunities to contribute to resolving housing and associated community development problems in Aotearoa New Zealand, and what some of the potential medium and long-term impacts of the proposed research might be.

The Chair of the Governance Group and the

Directors held a joint meeting with the Science Leadership Teams on 26 June to discuss investment priorities and the primary focus on research questions linked with two Strategic Research Domains.

### 2.3.3 STRATEGY ALIGNMENT SCAN

The Challenge Directorate has undertaken a review of relevant New Zealand sector strategies, plans and position papers (Table 3) to establish areas of alignment and points of influence for Phase 2 research. While we have checked alignment with current strategies the Directorate is also aware that many of these strategies, such as the Business Growth Agenda, are being reviewed, amended and replaced by the current Government. Where appropriate the signalled future direction of a strategy or policy has been incorporated into the future direction of the Challenge. A recent example of this is the reinstatement of the promotion of economic, social, environmental and cultural wellbeing into the purpose of the Local Government Act.

Key issues and topics emerging from this strategy alignment scan that are relevant to the BBHTC Challenge include:

- Intergenerational wellbeing
- System and community resilience
- Population dynamics and structural ageing
- Regional development
- Māori economic development
- Māori housing supply
- Affordable housing supply
- Collaboration and multi-agency approaches
- Positive outcomes for communities, whānau and families
- Community partnership and local action
- Long-term certainty of operating environment and system
- Living at density
- Enabling innovation

**Table 3: National strategies, plans and position papers**

ORGANISATION	DOCUMENT	DATE
Ministry of Health	<a href="#">Health of Older People National Strategy</a>	2017
Ministry of Business, Innovation and Employment	<a href="#">Business Growth Agenda</a> He Whare Āhuru He Oranga Tangata - <a href="#">The Māori Housing Strategy</a> He Kai Kei Aku Ringa - <a href="#">Māori Economic Development Strategy and Action Plan</a> <a href="#">National Pipeline Report on Building and Construction</a>	2017 2014 2012 2017
Ministry of Social Development	<a href="#">Housing First Strategy</a>	2018
Ministry of Transport	<a href="#">Transport Research Strategy</a> <a href="#">Transport Domain Plan</a>	2016 2016
Office of Senior Citizens	Positive Ageing Strategy Review <a href="https://www.beehive.govt.nz/release/new-positive-ageing-strategy">https://www.beehive.govt.nz/release/new-positive-ageing-strategy</a>	2018
Superu	Families and Whānau Status <a href="http://www.superu.govt.nz/publication/families-and-whānau-status-report-2018">http://www.superu.govt.nz/publication/families-and-whānau-status-report-2018</a> Neighbourhood Social Mix and Outcomes for Social Housing Tenants: Rapid Review <a href="http://www.superu.govt.nz/social_housing_rapid_review">http://www.superu.govt.nz/social_housing_rapid_review</a>	2015 2015
Treasury	<a href="#">30-Year New Zealand Infrastructure Plan</a> <a href="#">Living Standards Framework</a>	2015 2017
Commission for Financial Literacy & Retirement Income	<a href="#">Housing Assets: A Paper for the 2013 Review of Retirement Income</a>	2013
Land Information New Zealand	<a href="#">New Zealand Geospatial Strategy</a>	2007
Productivity Commission	<a href="#">Low Emissions Economy</a> <a href="#">Housing Affordability</a> <a href="#">Better Urban Planning</a>	2018 2012 2017
BRANZ	<a href="#">The Industry Transformation Agenda</a> Next steps and priorities for the Medium Density Housing (MDH) programme (Internal Report) <a href="https://www.branz.co.nz/mdh">https://www.branz.co.nz/mdh</a> Adopting New Ways in the building and construction industry (In press)	2017 2018 2018
University of Canterbury	<a href="#">Building Innovation Partnership</a>	2018
Community Housing Aotearoa	<a href="#">Getting Ready</a> <a href="#">Our Place</a> Progressive Homeownership	2018 2017 2018
United Nations	<a href="#">Sustainable Development Goals</a>	2017



### 2.3.4 RESEARCH LANDSCAPE AND GAPS ANALYSIS

A BBHTC-commissioned review has been completed of recent research that has been funded through the public good science investment system and BRANZ levy funding, as well as research that has been undertaken by postgraduate university students (Saville-Smith et al. 2018). The review does not include research funded by BBHTC. Over 400 research outputs published since 2012 as well as theses completed over the past six years were documented in this partial review of the research landscape.

This review revealed:

- research relevant to the BBHTC has been dominated by:
  - ♦ analysis of poor health outcomes for vulnerable groups who are poorly housed,
  - ♦ building products,
  - ♦ industry productivity,
  - ♦ innovation.
- lack of research into:
  - ♦ affordable housing (rather than housing affordability) – build cost, access cost, operating cost over building and household life cycles and housing typologies;
  - ♦ changes in the current housing system, including tenure;
  - ♦ the nature and implications of demographic change and household and cultural diversity for dwellings, neighbourhoods and regions;
- an absence of solutions-building research.

Analysis of the research landscape and the gaps that have been identified has informed the research priorities identified in the next section. Addressing the gaps requires a cross-sectoral, multi-disciplinary approach that can deliver integrated research across scale, with a range of institutional and systems configurations, assemblages and practices. It also requires research able to engage with the conditions, structural inequalities, historical legacies, cultural attachments and experiences of

Aotearoa New Zealand's diverse communities.

Over the 18 months that the BBHTC research programme has been active good progress has been made in unpacking the complexities of how our homes and spaces are delivered (or not) in different cultural contexts, and how spatial design, infrastructure and amenity affects wellbeing in neighbourhoods in Auckland and in smaller towns and cities in other regions and rohe. Research funded by the Challenge has ranged across baseline quantitative and qualitative research, including innovative community-based research informed by kaupapa Māori methods, to solutions development including the co-production of decision tools, value cases, GIS and digital information platforms and guidelines.

Having produced some sound, evidence-based findings, at a range of scales, relating to Aotearoa New Zealand's contemporary housing and urban development problems investment in research during Phase 2 will focus on a small number of high priority issues where the Challenge has the potential to contribute to high impact outcomes that will improve the wellbeing of all New Zealanders.

## 2.4 STRATEGIC RESEARCH DOMAINS

BBHTC's two Strategic Research Domains (SRDs) for the second phase of funding are:

- Homes and spaces for generations | Kāinga Tahi, Kāinga Rua which asks how homes and the spaces that work for people can be delivered for all communities and generations, now and into the future, and
- Thriving communities and regions | He Pā Harakeke which addresses the question how towns, cities, communities, and the regions in which they are located, can deliver functional, hospitable, productive and protective homes, kāinga and neighbourhoods.

The SRDs align with the Coalition Government's stated desire to address poverty and inequality, surging house prices, housing shortages, a lack

of affordable housing, and fostering regional development (Arderon 2017). They also reflect experiences shared internationally.

Many other countries find themselves beset by widening income inequalities, the financialisation of housing, heated house prices, unmet housing need, and under-supply of affordable housing especially, but not only, in major urban areas (Florida 2017, Nolan 2018). Internationally, researchers are grappling with how to understand the dynamics of those problems, while also highlighting the impacts on homes and regions of other critical developments. One is structural ageing and associated regional population decline, a phenomenon of many post-industrial societies including Aotearoa New Zealand (Jackson 2017; Jackson and Brabyn 2017, Johnston et al. 2014, Lutz et al. 2004, Matanle 2017).

Structural ageing also has implications for the housing stock. Another critical development is the accumulated environmental effects of dwellings, towns and cities. These effects include climate change but also degradation of fertile soils, air and water. Just as structural ageing demands an adaptable dwelling stock, neighbourhoods, towns and cities, so too our built environments must adapt to new climatic conditions (Roaf et al. 2016).

#### **2.4.1 OVERVIEW OF THE TWO STRATEGIC RESEARCH DOMAINS**

##### ***Homes and spaces for generations | Kāinga Tahi Kāinga Rua***

The focus of this SRD is on how homes and neighbourhoods can work not only for the generations that currently use them but provide for future generations. Housing stock in many parts of Aotearoa New Zealand is not performing well in terms of quality of buildings, housing functionality over people's life cycles, and housing costs in relation to incomes. The amenities, connectivity, accessibility and security of neighbourhoods vary significantly. They are typically dominated by the private car, impose significant transport costs on low and moderate income households and exclude those unable to drive or access car ownership.

Towns and cities continue to be predominantly low density and sprawl into greenfields, a tendency that exacerbates car dependency, loss of fertile soils and productive landscapes, and the costs and risks associated with infrastructure in environments vulnerable to adverse natural events. To date, intensified spaces and housing typologies have failed to deliver affordable, functional housing.

Over the past 18 months BBHTC research has explored a range of dynamics and determinants associated with those problems. It has highlighted that the shape of new-built homes and spaces reflect decisions and interactions between a range of financial actors, housing providers, the development, building and construction industries, and a web of regulatory and planning activities. The decisions of those actors do not necessarily reflect the needs of changing and diverse individuals, families and households that use dwellings and neighbourhoods. Indeed, as homes become primarily treated as a vehicle for realising returns, use-values such as liveability, functionality, and reasonable entry and living costs become less pressing imperatives. The amenities and management of neighbourhoods also become shaped by, and shape, the real estate values of the dwellings located in them.

The burden of misalignments between people's needs, available housing and the amenities of neighbourhoods falls disproportionately on Māori, Pacific communities, people with disabilities, children and older people (Johnston et al. 2018, Murphy & Rehm 2016, James & Saville-Smith 2010). Evidence in Aotearoa New Zealand and overseas suggests that current dynamics reinforce housing classes and inequalities (Perry 2017). They fuel concentrations of neglect, dereliction and under-provision in some neighbourhoods while, ironically, at the same time making them vulnerable to regentrification and displacement of vulnerable people and communities. At the core of this is a lack of affordable housing.

Affordable housing is functional housing that meets the needs of diverse households with low to moderate incomes at a price that enables them to

meet other essential living costs, meet an acceptable standard of living, and promotes independent living and economic and social participation.

Affordable housing does not simply provide for people who require high levels of assistance in state or social housing. There are many households that cannot afford dwellings currently brought to market or by market-oriented developers and builders.

Table 4 sets out the three segments of housing production and their characteristics and marks the two segments that the BBHTC will focus on in this domain.

The production of affordable housing, as measured by the proportion of new dwellings in the lower quartile of value, has declined significantly since the early 1990s (Figure 3).

BBHTC research shows that the significant under-supply of affordable housing has been exacerbated by a variety of factors including residual land pricing, exclusionary covenants and, since the 1990s, a reduction in the “dedicated stream of government capital investment, which levers both household investment and community sector investment, [and] effectively disincentivised the building industry from the production of affordable housing” (Figure 3; Saville-Smith 2018: 13).

### ***Thriving communities and regions | He Pā Harakeke***

Around half of Aotearoa New Zealand’s population lives in towns and cities with populations between 10,000 and 400,000. Among these “second tier” cities and towns, those with populations between 10,000 and 65,000 show the greatest diversity in demography and economic performance. Recent BBHTC research has indicated that slowing population growth does not necessarily have to equate with declining local economies, stagnating towns and shrinking housing markets (Grimes 2017, Apatov & Grimes 2017, Cochrane et al. 2017, Meade & Grimes 2017, McKay & Perkins 2017). However, regions experiencing growth in their populations and economies are more likely to support good homes and communities. Affordable house supply and functional neighbourhoods, along

with the transport infrastructure that connects people from houses to regions, are critical to human capital, cultural richness, and economic productivity in the regions and their towns and cities.

Some councils in smaller towns and cities have recognised that affordable housing is a critical pathway to regional success and an under-supply of affordable housing acts as a brake on economic and social performance and cultural wellbeing. However, there is almost no research exploring the relationship between regional success and affordable housing supply including the role of papakāinga within the regional housing system. In 2007 a Bay of Plenty study found that the lack of affordable housing meant forecast regional Gross Domestic Product (GDP) was lowered by around \$280 million and job growth lowered by 12% (6,640 fewer jobs) for 2001-2031 (Capital Strategy & SGS Economics and Planning 2007). This finding resonates with emerging findings in BBHTC research to date and is consistent with findings from overseas research (Gurran & Bramley 2017, Springler 2014).

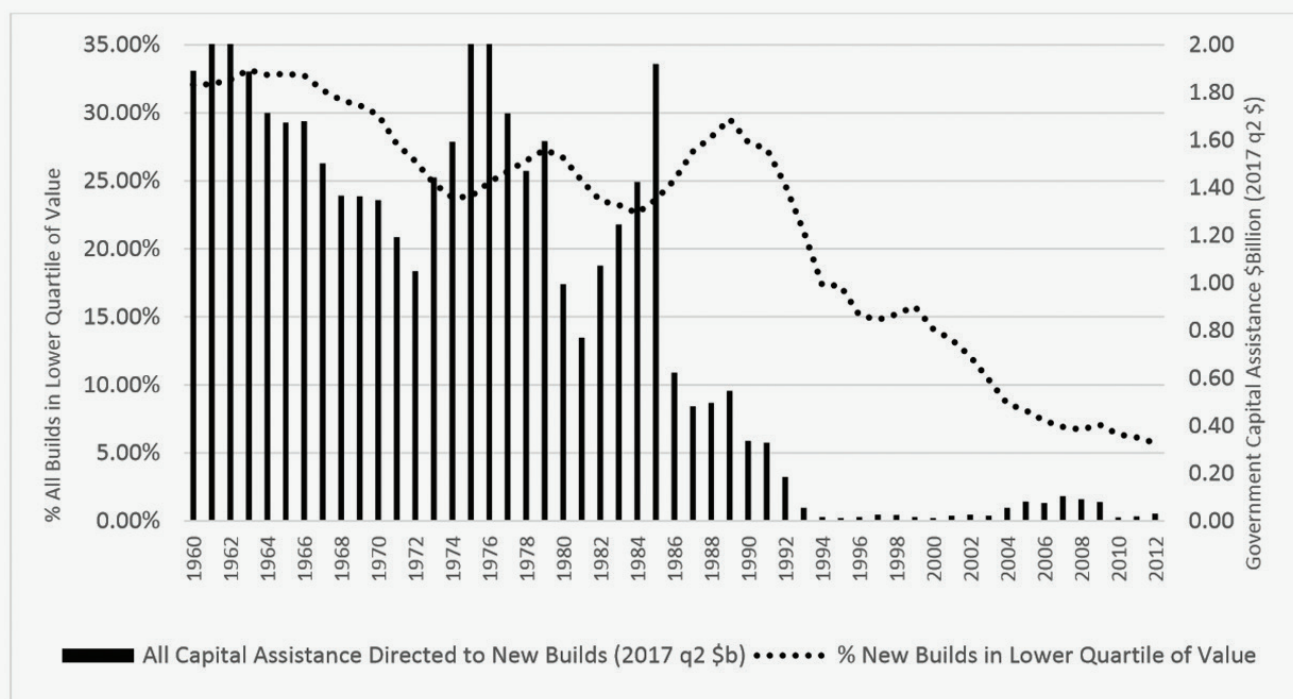
The core issues of how regions can facilitate the supply of affordable housing under the current legislative framework remains, and the particular spatial patterns that optimise or inhibit affordable housing in specific contexts have yet to be established. The second funding period allows the research to recognise that urban settlements and rohe outside the main metropolitan cities differ considerably in industrial structure, population characteristics and performance. Some of them are located near larger towns and cities with their major transport links, but many have a more peripheral location. Many have significant Māori communities including traditional marae and other cultural institutions that are critical to regeneration te reo Māori, (Olsen-Reeder et al 2017).

While the economies and populations of some second-tier settlements are stagnating or contracting, others are thriving, attracting internal and external migrants and firms from major cities as well as the return of whānau from the cities to take up ahi kaa roles within Māori communities. BBHTC



**Table 4: The housing supply continuum (affordable housing in BBHTC's strategy includes social housing and affordable housing)**

	SOCIAL HOUSING	AFFORDABLE HOUSING	MARKET HOUSING
GOAL	Wellbeing Community building	Wellbeing Community building	Profitable business
FINANCIAL CHARACTERISTICS	<ul style="list-style-type: none"> <li>▪ Subsidized capital</li> <li>▪ Land contributions</li> <li>▪ IRR or As-subsidised revenue (rents)</li> <li>▪ Leveraged, asset-based lending</li> <li>▪ Service contracts</li> <li>▪ Break-even, limited surplus</li> </ul>	<ul style="list-style-type: none"> <li>▪ Subsidized capital</li> <li>▪ Land contributions</li> <li>▪ Leveraged asset-based borrowing</li> <li>▪ Householders co-payment</li> <li>▪ Revenue surplus, revolving fund</li> </ul>	<ul style="list-style-type: none"> <li>▪ Development Capital</li> <li>▪ Leveraged asset-based borrowing</li> <li>▪ Profit</li> </ul>
USERS	<ul style="list-style-type: none"> <li>▪ Lowest income</li> <li>▪ Multiple needs</li> <li>▪ Limited resources</li> </ul>	<ul style="list-style-type: none"> <li>▪ Low and middle income</li> <li>▪ LVR affected</li> <li>▪ Prudential issues</li> <li>▪ Housing stress</li> </ul>	<ul style="list-style-type: none"> <li>▪ Income/Asset endowed</li> <li>▪ Able to meet</li> <li>▪ Median Rents</li> <li>▪ Prudential reqs.</li> </ul>
SERVICES	Whānau Ora wraparound	Whānau Ora <ul style="list-style-type: none"> <li>▪ Housing management</li> <li>▪ Strengths development</li> <li>▪ Budget management</li> </ul>	House delivery
TENURE	<ul style="list-style-type: none"> <li>▪ Primarily rental</li> <li>▪ Limited intermediate tenures</li> </ul>	<ul style="list-style-type: none"> <li>▪ Intermediate tenures</li> <li>▪ Home ownership</li> </ul>	<ul style="list-style-type: none"> <li>▪ Home owners</li> <li>▪ Property investors</li> <li>▪ Retirement village</li> </ul>
BUILDING	Lower quartile value	Lower quartile value	Upper quartiles of value



**Figure 3: Estimated government capital assistance to new builds and proportion of all new builds delivered as affordable housing 1960-2012 (Saville-Smith, 2018:13)**

research is focussed on Aotearoa New Zealand's largest cities as well as a selection of second-tier cities and towns. They have the greatest potential to reveal the connections between regeneration activities and success, and they are vitally important for regional growth.

#### 2.4.2 DOMAIN INTEGRATION AND RESEARCH OBJECTIVES

In Aotearoa New Zealand and elsewhere, research around regions has tended to be decoupled from research into dwellings and their neighbourhoods. This is beginning to change as the profound connections between regional systems, housing systems and the design of towns and cities has become better understood. During the second phase of funding, BBHTC intends to push that approach forward by adopting a 'room to region' approach.

The two SRD domains will be integrated through the focus on affordable housing in household, kāinga, neighbourhood, settlements, rohe and regional contexts. That integration is reflected in the set of objectives which all research programmes will be expected to illuminate in whole or in part, and the funding of four priority investment areas.

The research objectives which will frame funding allocations will be to:

- Establish the characteristics of affordable housing with reference to both capital and operating costs, its build, distribution and consumption.
- Understand the characteristics of housing systems that support or inhibit affordable housing production.
- Understand the impacts of settlement design and amenities, social and transport infrastructures, and spatial configuration for affordable housing supply.
- Explore settlement and rohe change and affordable housing supply in the context of trends impacting on New Zealand's future:
  - ♦ Structural ageing, population diversity

and migration

- ♦ Globalisation and uncertainty
  - ♦ Climate change
  - ♦ Expansion of inequality
  - ♦ De-population and re-population dynamics
- Establish the value of affordable housing in the context of regional economies, cultural enrichment and social engagement.

Particular attention will be given to the situation of Māori and the impacts of structural ageing. The situation relating to Māori housing is distinctive, given the differing access to land that mana whenua and taura here have in urban settings, and different Māori population dynamics and family structures. During the second phase of funding priority will be given to research that addresses access to affordable housing for Māori in different regional and urban contexts. In this context, as Simmonds et al. (2017, p. 82) point out, "the deeply embedded relationships to place and the subsequent responsibilities held by mana whenua make them well-placed to champion and, in fact, to lead regional revitalisation in Aotearoa."

Second, in Aotearoa New Zealand the history of both national and subnational demographic change has been complicated by different dynamics for the indigenous Māori population (Pool 1991, 2015a; Kukutai 2011, Axelsson et al. 2016, Simmonds et al. 2016, Cochrane & Pool 2017) and for the immigrant populations and their descendants since the early 19th century (Pool 1985, 2015b, 2016, 2017; Pool et al. 2007, Spoonley & Bedford 2012). There is, too, considerable variation in the rates at which regions are experiencing structural ageing and the responsiveness of housing markets to changing demographics (Johnson et al. 2018).

#### 2.4.3 INVESTMENT PRIORITIES

Research funding is expected to be allocated across four priority investment areas (PIA) that connect issues across the scales of dwellings, kāinga neighbourhoods, town, cities and regions. Three of these relate to research that is embedded in

the two Strategic Research Domains. The fourth, which is still under negotiation and which links with proposals contained in section 8 (Scenario Planning), relates to collaborative research ventures with other National Science Challenges. One such proposal is well-developed, and it is with the Ageing Well NSC and addresses the question: how can we have age friendly built environments across the scales from home to region?

All PIAs for research funded directly by BBHTC in Phase 2 are situated within an over-arching priority of delivering better housing and wellbeing outcomes for Māori. There is no specific investment quota for both kaupapa Māori and Māori-related research, but the Challenge's commitment to a strong, partnership-based approach to research that underpins its Vision Mātauranga strategy (see section 3) will ensure BBHTC's research delivers for Māori.

Research questions that will be addressed in the three PIAs that are embedded in the Strategic Research Domains will be finalised during a contestable research funding process between November 2018 and April 2019 (see section 5.2). Some indicative questions that are very relevant to each of the PIAs include:

### **1. Defining the Affordable Home**

This PIA will focus on how affordable housing should be understood in contemporary Aotearoa New Zealand, including treaty settlements, shared equity and housing opportunities on multiply-owned Māori land, taking account of housing generated costs beyond direct payments such as rents or mortgages, rates and insurances. In particular, there will be a focus on the impact of costs associated with the pursuit of affordable rents or mortgages such as transport costs where lower cost housing is provided in areas that are poorly connected or have limited transport options. The latter have been recognised as problematic

for the living standards of low and moderate income households and have implications for spatial planning, the use of greenfield sites, intensification and transport.

### **2. Getting Better from Value from Homes and Neighbourhoods**

The foci of this PIA include: How can we get better value from our neighbourhood built environments, infrastructure, and housing stock (both existing and new) through adaptability, size and typology, and utilisation? How can we maximise affordable build performance, build quality, and functionality in an ageing and diverse society? How can affordable housing, irrespective of tenure, be adaptable and functional? What are the private and public net benefits of affordable well-performing, adaptable new and retrofitted dwellings? How will the value realised from affordable homes and spaces differ according to metropolitan, second-tier urban, and regional settings?

### **3. Affordable Housing and Thriving Regions.**

The foci of this PIA include: Does affordable housing under-supply become a brake on regions and (on the other side of that coin) does affordable housing supply act as a stimulus to regional revitalisation? How can local and regional governance support communities, address affordable housing supply issues, and manage house and neighbourhood (including social, environmental and other infrastructure) performance? Can derelict or dysfunctional housing (which is known to undermine communities and compromise household wellbeing) be addressed at the local and regional scales? What are the risks and opportunities for housing access, functionality and affordability associated with depopulation and re-population?



### 3. GIVING EFFECT TO VISION MĀTAURANGA POLICY |

**BBHTC is delivering to MBIE's Vision Mātauranga (VM) policy which aims "to unlock the science innovation potential of Māori knowledge, resources and people" for the benefit of New Zealand (MBIE 2018). The Challenge's research has relevance for all four areas of the VM policy framework – indigenous innovation, taiao, hauora/oranga and mātauranga – especially mātauranga (indigenous knowledge and research) and hauora/oranga (improving health and social well-being).**

VM is deeply embedded at all levels in the Challenge due to a partnership approach and model that was enacted from the outset. BBHTC has both a Director and Director Māori as well as over 40 Māori involved in research and research leadership that connect Challenge research, impacts and outcomes to diverse Māori communities, marae, whānau, hapū and Iwi.

The partnership approach is given effect in the strategy for the next five years through an enhanced commitment to embedding mātauranga Māori in the Challenge research programme. Every research project funded by the Challenge will be assessed in terms of its demonstration of delivery to Vision Mātauranga through appropriate methodologies, engagement of Māori researchers and partnerships with diverse Māori communities, marae, whānau, hapū and Iwi.

In addition to giving effect to VM policy, the Challenge's Governance Group has approved an investment signal that clearly acknowledges the priority that has been given to research that has the potential to contribute to reducing Māori housing costs and shortages, fostering effective papakāinga development, and addressing culturally specific needs of mana whenua and taura here within urban settlement contexts.

Fundamental aspects of the Māori world view and its expression in research have been adopted by the Challenge. Māori research is embedded in relationships with diverse Māori communities, marae, whānau, hapū and Iwi and focuses in the areas of hauora, whairawa (new economic solutions for Māori housing) and papapkāinga. These foci align delivery directly to the Vision Mātauranga themes of hauora, taiao and mātauranga. Furthermore, the incorporation of AKO as an Indigenous knowledge exchange methodology enhances the innovation potential of the Māori research programme to disrupt current ways of thinking about Māori housing and support transformational change. The AKO methodology will be extended across all research in next five years to enhance end-user uptake and impact.

VM and partnership principles are also reflected in the Challenge's commitment to building Māori researcher capability and capacity. This will be achieved through an expanded Māori scholarship programme linked to research projects. These scholarships will contribute to ensuring a next generation of Māori researchers, skilled in kaupapa Māori methods, receive training in disciplines that enable them to address Māori housing, planning, design and wellbeing issues in the future.

A model that is being trialled in the current Kāinga Tahi, Kāinga Rua SRA, where senior Māori researchers (tuakana) mentor and support emerging and mid-career Māori researchers (teina) will be extended during the next phase of funding. Currently through the Director Māori, BBHTC provides administrative support to a network of NSC Māori research managers and directors. This network is working collaboratively to co-ordinate capability and capacity building activities for Māori researchers in all NSCs.

## 4. LEVERAGING NATIONAL AND INTERNATIONAL RESOURCES |

### 4.1 NATIONAL RESOURCES

**BBHTC has brought together 120 researchers in Aotearoa New Zealand in new team configurations to apply their knowledge and experience to address issues relating to housing and urban development in Aotearoa New Zealand. These teams include researchers who, collectively, list over 80 academic and professional disciplines as their training and/or jobs. The networks these researchers bring to the Challenge are extensive, and have been leveraged continuously in the development of the Challenge's research programme.**

One example of this leveraging is the contribution the Challenge's multidisciplinary teams are making to building research capability. BBHTC's research teams include a significant number of early-career researchers in a range of institutional settings. The Challenge has committed resources to support postgraduate training, in association with some of the universities which are BBHTC Collaborating Parties, and has signaled that additional scholarship support will be available for people working in community-based or private sector research organisations, especially Māori, during Phase 2.

Another example of leveraging national resources is provided by the research team and associated network of endusers, stakeholders and collaborating communities in the Kāinga Tahu, Kāinga Rua SRA. Amongst the 42 Māori researchers engaged in Challenge-sponsored research in this SRA are several of the country's leaders in housing, urban design, papakāinga development, economics and kaupapa Māori research. Also involved are several early career Māori researchers working for community organisations. Through participation in the Challenge the latter are gaining additional skills in return for the valuable knowledge and linkages they bring from their community-based research.

In order to establish the additionality that Challenge-sponsored research might be able to

provide in the Māori housing area a Māori housing hui was held in January 2018 involving many researchers and representatives of community agencies and stakeholders. This hui provided critical input into the designing of the Kāinga Tahu, Kāinga Rua research programme – a process that is described in a report which can be accessed at [http://www.buildingbetter.nz/news/2018/SRA5\\_think\\_tank\\_hui.html](http://www.buildingbetter.nz/news/2018/SRA5_think_tank_hui.html).

Another example of leveraging national resources can be found in an initiative taken by MBIE in association with senior officials in other government agencies dealing with natural resources, including housing and transport. BBHTC is one of the National Science Challenges that is invited to participate in periodic meetings with senior officials from these agencies. The first action point in the minutes from the meeting of this group on 20 March 2018 requests the Ministry for the Environment to take the lead in co-ordinating a meeting involving several of the agencies and BBHTC "to develop clear cross-government housing, spatial planning and research needs alongside the BBHTC Challenge". The Challenge Director has been involved in a number of meetings with this group since March as part of the stakeholder consultation associated with the development of the strategy for Phase 2 research.

The recent decision to establish a new Ministry of Housing and Urban Development, as well as the earlier announcement of a multi-billion dollar Provincial Growth Fund to be managed by a new Provincial Development Unit within the Ministry of Business, Innovation and Employment, are clear signals that the Coalition Government recognises there are serious problems to be addressed relating to housing and regional development. Members of the Challenge Directorate and Governance Group met with the Minister of Housing and Urban Development on 12 July to discuss the Challenge's strategy for the next five years.

At the individual level Challenge researchers,

Directors and members of the Governance Group are well connected with a wide range of national and community agencies that work in areas aligned to the BBHTC. Examples of these links are provided in Table 5. The significance of these connections for the Challenge's research programme is that BBHTC teams are kept informed of the priorities of potential endusers of research. This allows the Challenge's research programme to be responsive to developments in fast-moving areas of public policy and practice. The Challenge is endeavouring

to ensure that it has an ability to respond to changes in Government as well as private sector and community priorities in the areas of housing and urban development (see section 5.1).

In terms of leveraging research on housing and urban development issues in New Zealand, the Challenge's Principal Investigators are active publishers and participants in local and national conferences. Details of these activities can be found in the Annual Report for 2017/18 and on the Challenge's website <http://www.buildingbetter.nz>

**Table 5: Examples of links with national and community agencies**

AGENCY/ORGANISATION/GROUP	BBHTC RESEARCHER/GOVERNANCE GROUP MEMBER
<b>CENTRAL GOVERNMENT ROLES, STRATEGIES AND GROUPS</b>	
Ministry of Transport Chief Science Advisor	Simon Kingham, Challenge principal investigator
Positive Ageing Strategy Ministerial Advisor Group	Chris Cunningham, Natalie Jackson, Challenge researchers. Kay Saville-Smith, Challenge principal investigator
Ministerial Welfare Expert Group	Ganesh Nana, Charles Waldegrave, Challenge researchers
Ministry for the Environment – Technical Advisory Group for air quality	Guy Coulson, Challenge researcher
Ministry for the Environment – Urban water, water sensitive design/GMP working Group	Jonathan Moores, Robyn Simcock, Challenge researchers
Ministry of Education Mental Health Social Investment Fund: Education Expert Advisory Group	Angus Hikairo Macfarlane, Challenge principal investigator
NZTA/MoT Environment Knowledge Hub	Guy Coulson, Jonathan Moores, Challenge researchers
Ministry of Business, Innovation and Employment Pacifica Labour and Skills Unit, INZ, Adviser	Richard Bedford, Governance Group member
Ministry of Business, Innovation and Employment Building Advisory Panel	Andrew Reding, Governance Group member
Te Pūtāhanga o Te Waipounamu Whānau ora commissioning Agency	Gena Moses-Te Kani, Governance Group member
<b>LOCAL GOVERNMENT STRATEGIES AND GROUPS</b>	
Auckland Urban Design Panel	Lee Beattie (Chair (planning)); Rau Hoskins (Chair, Architecture, Cultural), Diane Menzies, Rebecca Kiddle, Lucy Tukua, Desna Whaanga-Schollum (AUDP Governance), Challenge researchers and principal investigators

Community of Practice, Stormwater Management Devices for Water Sensitive Urban Design, Auckland Council	Sue Ira, Robyn Simcock, Challenge researchers
Marlborough District Council Housing Forum	Bev James, Challenge principal investigator
<b>COMMUNITY AND LOCAL GROUPS</b>	
Anglican Church Social Justice Housing Portfolio Group	Jade Kake, Challenge researcher
Habitat for Humanity (Northland)	Jade Kake, Challenge researcher
Hobsonville Point Residents Association	Errol Haarhoff, Challenge principal investigator
Marlborough Sustainable Housing Trust	Bev James, Challenge principal investigator
<b>PROFESSIONAL</b>	
BIM Acceleration Committee	Andrew Reding, Governance Group member
BRANZ Transformational workshops for the building and construction industry	Kay Saville-Smith, Challenge principal investigator
BRANZ – Warmer, Drier, Healthier Buildings Advisory Group	Kay Saville-Smith, Challenge principal investigator
BRANZ – Medium Density Housing Advisory Group	Karen Witten, Challenge researcher
BRANZ - Exceeding the Minimum Advisory Group	Ruth Berry, Challenge Director
Community Housing Aotearoa – critical friend – getting ready initiative	Kay Saville-Smith, Challenge principal investigator
New Zealand Landscape Foundation	Diane Menzies, Desna Whaanga-Schollum, Challenge researchers
Ngā Aho, Māori Design Professionals Inc Soc	Carin Wilson, Desna Whaanga-Schollum, Diane Menzies, Jade Kake, Jacqueline Paul, Lucy Tukua, Rau Hoskins, Rebecca Kiddle, Challenge researchers
Ngāti Whātua Ōrākei Whai Rawa Limited Board	Ngarimu Blair, Governance Group member
Ngāruawāhia Community Board	James Whetu, Challenge researcher
Passive Housing Institute New Zealand Board	Andrea Stocherro, Challenge researcher
PrefabNZ Board	Daiman Otto, Challenge researcher
Te Matapihi he Tirohanga mō te Iwi Trust	Rau Hoskins, Challenge researcher
Waikato Housing Hub Trust	James Whetu, Challenge researcher
Royal Society Te Apārangi and its link with the PM's Chief Science Adviser network	Richard Bedford, Governance Group member
<b>RESEARCH</b>	
Ageing Well National Science Challenge Strategic Advisory Group	Mary Simpson, Challenge researcher



Recently a comprehensive scan of the research landscape relevant to BBHTC's mission was completed and used to identify the major gaps that could be addressed by Challenge researchers in Phase 2 (see section 2.2.4). This scan covers published research as well as postgraduate research theses on housing and urban development since 2012 (Saville-Smith et al. 2018).

Another way of leveraging national resources is through collaborative research ventures with other National Science Challenges. Proposals regarding three potential collaborations are contained in section 8, Scenario Planning.

## 4.2 INTERNATIONAL RESOURCES

BBHTC members are active participants in a wide range of international institutes and networks. Some of the most important ones are listed in Table 6.

BBHTC researchers regularly present findings from BBHTC-related research in major conferences in

Australia, the United Kingdom, Europe and North America. A recent example of this international engagement is the participation of Dr Kay Saville-Smith, Professor Laurence Murphy and Dr Bev James, all Principal Investigators in the Understanding the Architecture and logic of decision-making SRA, in the European Network for Housing Research (ENHR) Conference in Uppsala (June 26-29 2018). Professor Murphy presented a paper on "Calculative devices, development feasibility and the residential development process" in a workshop on Housing and Social Theory, and Dr Kay Saville-Smith presented a paper, cited several times in Section 2.4, on "Revitalising the production of lower-value homes: is it a desirable or even possible pathway to affordable housing?" (Saville-Smith 2018).

Conferences like the ENHR bring together researchers addressing housing and urban planning issues from across the world and are excellent opportunities for leveraging the latest international research. They are also opportunities for taking

**Table 6: Examples of participation by BBHTC researchers in international networks and meetings**

COUNTRY	RELATIONSHIP
Australia	<ul style="list-style-type: none"> <li>Australian's Housing and Urban Research Institute (AHURI), a national independent research network that had its 2017 conference in Auckland</li> <li>Australian and New Zealand Association of Planning Schools (ANZAPS) has BBHTC sponsorship and participation for its conference in Hamilton in November 2018</li> <li>California Coalition for Rural Housing.</li> <li>Australian Health Protection Agency Panel of Experts</li> </ul>
Asia Pacific	<ul style="list-style-type: none"> <li>Pacific Rim Universities Sustainable Cities and Landscapes Research Hub</li> <li>Asia-Pacific Network for Housing Research (APNHR)</li> <li>Indigenous Group, Human Development and Capability Association</li> </ul>
North America	<ul style="list-style-type: none"> <li>Californian Rural Housing Network</li> </ul>
Europe	<ul style="list-style-type: none"> <li>European Regional Science Association</li> <li>London School of Economics Spatial Economics Research Centre</li> <li>UK Collaborative Centre for Housing Evidence (Glasgow)</li> <li>School of Architecture, Planning and Environmental Policy (Dublin)</li> <li>European Network of Housing Researchers (ENHR);</li> <li>European Urban Research Association</li> <li>ERSA Prize Committee (European Regional Science Committee).</li> </ul>
World	<ul style="list-style-type: none"> <li>Passive and Low Energy Architecture (PLEA) Network</li> </ul>

findings from world-leading scholarship on the application of indigenous research methodologies in mission-led research. Dr Ella Henry, a member of BBHTC's Science Leadership Team, and a Principal Investigator in the Shaping Places: future neighbourhoods SRA, presented a paper at the Gender, Work and Organisation Conference at the University of Sydney (13-16 June 2018) on "Operationalising Vision Mātauranga and Kaupapa Māori research in a National Science Challenge" (<https://www.aut.ac.nz/profiles/ella-henry>)

Examples of overseas research that has been influencing the development of thinking in the Shaping places: future neighbourhoods SRA include the UK Green Building Council's Cities Programme research on social value in new housing developments (UKGBC 2018), the NHBC Foundation's futures-oriented research on the new home in 2050 (Studio Partington 2018), the Australian Housing and Urban Research Institute's report on supporting affordable housing through inclusionary planning in new and renewing communities in Australia (Gurran et al. 2018)

and research by Professor Susan Roaf and her colleagues in the UK on adapting buildings and cities to climate change (Roaf et al. 2016).

Other examples of interaction with and leveraging off international research can be found in the innovative research on decision-support tools that are being critically examined in the Understanding the architecture and logic of decision-making SRA (Murphy 2014, McAllister 2013, McAllister et al. 2016), and the research that the New generation Information for improved outcomes SRA is undertaking into novel spatial information systems software for land use planners and policy makers (Stevens et al. 2007, Pelzer et al. 2014).

Finally, the international members of BBHTC's Independent Science Advisory Panel attend our conferences and research symposia and have observed that the BBHTC NSC is one of the largest dedicated research investments in housing and urban-related research anywhere in the world. They are a critically important "international resource" for the Challenge.



**Māori Kāinga Tahi, Kāinga Rua Researchers. Think tank, Wellington, June 2018**

## 5. RESEARCH, SCIENCE & TECHNOLOGY QUALITY |

BBHTC owes its origins to pressures from a diverse group of researchers, planners, policy makers and community development organisations for investment in mission-led research to address some fundamental challenges facing New Zealand's highly urbanized society in the 21st century. BBHTC was added to the initial list of 10 National Science Challenges and, from the outset, has included many of Aotearoa New Zealand's leading researchers addressing housing and urban development issues.

In this section two key issues relating to RS&T quality are addressed:

1. The multi-disciplinary research teams, with significant Māori participation, from a range of universities, CRIs, IROs and private sector research organisations;
2. The processes used to ensure quality research proposals are funded.

### 5.1 THE "BEST" RESEARCH TEAMS

#### 5.1.1 A DISTINCTIVE GENESIS

Reference has already been made to the 120 researchers identifying with over 80 disciplines and sub-disciplines that are engaged in research programmes and projects funded by BBHTC. Researching ways of improving the quality and supply of housing and creating smart and attractive urban environments requires people with skills in a wide range of academic and professional skills. Because the bid for the original Challenge funding emerged from concerns amongst researchers, planners, policy makers and community organisations the team that developed the initial proposal was quite diverse. Many of Aotearoa New Zealand's leading researchers based in universities, Crown Research Institutes (CRIs), Independent Research Organisations (IROs) and private companies, who were actively pursuing inquiries into aspects of housing supply and quality, smart systems of data generation and analysis, and urban development and planning, were involved in preparing this bid.

Reference to the way the BBHTC Challenge emerged is important because it has not so much been an issue of a host organization seeking out the "best" research teams. It can be argued that most of the "best" researchers in the areas covered by the Challenge were in the group that coalesced around an Independent Research Organisation

(IRO), BRANZ (our host), that was dealing directly with applied research relating to the building industry and which was very interesting in seeing significantly more investment in excellent research that addressed issues of housing supply and quality in Aotearoa New Zealand's highly urbanized society. The "best" researchers for this Challenge were drivers of the initial bid for funding.

#### 5.1.2 BEST TEAMS FOR PHASE 2

Building on experience gained over the past two years of investment in mission-led research, the Challenge Governance Group and Directorate favour a highly consultative, collaborative approach to building the best research teams rather than attempting to "pick winners" in advance of a well-designed research co-design and co-creation process with key stakeholders, endusers and communities. A key requirement of researchers in the Challenge is their ability to develop projects in collaboration with those who are in a position to implement findings from the research. This is not a skill or an interest that all researchers have and some senior academics and professional researchers, who could contribute to the Challenge, have chosen not to engage with this type of research.

The 120 researchers that are engaged in BBHTC's research programmes include a significant share of the country's "best" researchers interested in housing and urban development. A distinctive

feature of the Challenge is the large number of Māori involved in the programme as researchers and facilitators (43 in May 2017). The Governance Group and the Directorate have made a commitment to supporting the development of Māori research capability during the next five years. In this way the Challenge is supporting the Ministry's Vision Mātauranga policy which "aims to unlock the science and innovation potential of Māori knowledge, resources and people for the benefit of New Zealand" (MBIE 2018). As noted in other sections, Māori have some distinctive housing and urban settlement needs and the Challenge has prioritized these in the development of its high-level strategy for investment over the next five years.

## **5.2 ENSURING RESEARCH QUALITY**

### **5.2.1 ROLE OF THE INDEPENDENT SCIENCE ADVISORY PANEL**

BBHTC has made extensive use of both its Governance Group and its Independent Science Advisory Panel (ISAP) when assessing the quality of proposals for research that is funded by the Challenge. All research programmes requiring more than \$300,000 investment per annum that were part of the original Challenge proposal, as well as the two major contestable processes the Directorate ran during 2017, were sent to members of the ISAP for assessment as part of the investment decision process. The ISAP, and its independent view, is an important part of ensuring R, S & T quality for the Challenge through its involvement in Challenge investments, annual conferences and this mid-way review.

This group is termed an "Independent" rather than an "International" Science Advisory Panel because it has always had provision for Aotearoa New Zealand-based Māori members. A vacancy for a Māori member on the Panel is currently being filled and a second senior Māori researcher will be sought to join the group early in 2019, in time for the assessment of proposals for research that will be supported in Phase 2. In addition,

another international member will be added to the Independent Science Advisory Panel, to make a total of six members.

### **5.2.2 QUALITY ASSURANCE OF RESEARCH OUTPUTS**

Because much of BBHTC's research has only been in operation for less than 18 months an independent quality assurance process for research outputs has yet to be implemented. This is a priority for the next 12 months as research findings from recent investments become more numerous. At present the Challenge relies on the quality assurance processes that apply within universities, CRIs and IROs, as well as established journal peer review processes, to ensure the research meets high standards.

An independent quality assurance group to review research outputs before they are released as final Challenge documents on the website will be established early in 2019. Given that many outputs are being co-produced with stakeholders, the key findings from the research will be being disseminated to one of the key targets for outcome-based research before the final quality assurance processes are completed. This is an inevitable consequence of research that is collaborative and co-produced. Mechanisms to ensure the resolution of tensions around research findings that might challenge vested interests will be developed.

During the second five years much more of the Challenge's research is likely to appear in international journals. The lead time for publication in high-ranking journals is at least two years and it will be another year before many of our researchers are publishing findings from Challenge-funded research internationally and are involved in peer-reviewed conferences.

### **5.2.3 RESEARCH INVESTMENT AND DISINVESTMENT**

BBHTC has adopted rigorous processes with regard to approving investment by the Challenge in research and towards disinvesting in projects which



are do not have clear pathways to implementation for research findings. Research teams seeking funding in excess of \$300,000 per annum make presentations to the Governance Group and address questions relating to their proposals before funding is approved. Key stakeholders are also present at a number of these presentations to the Governance Group as part of the process of ensuring quality in collaboration and co-production.

During the first phase of funding the Governance Group, working in close association with the Directorate, decided not to fund one of the initial research programmes in the portfolio of research that was proposed for the Challenge. An independent review of performance with regard to this proposal indicated that it was unlikely to deliver research that could contribute to outcomes related to the Challenge's mission and objective.

A decision was also taken by the Governance Group to disinvest in research proposed by the team leading the Transforming the building industry SRA because the proposed research plan did not have convincing pathways to implementation of the findings. In this case the research team was given the option of proposing some discrete projects for research on specific aspects of their plan. One member has taken up this option and there is a project that has been funded addressing aspects of technology change in the building industry.

Several strategies that are now in place for local dissemination of important findings that have the potential to contribute to improvements in the quality and supply of housing and to the creation of smart and attractive urban environments will be continued. These include use of local publications directed at the building and construction industry

(e.g. BRANZ's journal Build), at local authority planners, iwi and hapū organisations, and key Government agencies (the "Science Stories" series compiled by the Ministry of Business, Innovation and Employment).

The BBHTC NSC has commissioned a major book on Māori housing initiatives and developments as part of its Kāinga Tahī Kāinga Rua Strategic Research Area. This ambitious output is being overseen by the Director Māori. It is designed to build capability and improve the research reporting skills of a large number of Māori who are at an early stage of their research careers. A rigorous peer review process has been established to support the venture, drawing on people with appropriate skills in research carried out within a kaupapa Māori epistemology. The hui and wananga that have been organized to further this innovative project, as well as the process of formalizing robust contracts for research outputs, have contributed significantly to building capability amongst a new generation of Māori researchers interested in housing and the development of their kāinga from the perspectives of mana whenua and taura here in a wide range of urban settings.

The BBHTC will run a negotiated contestable process late 2018 to early 2019 to create a portfolio of Challenge research that appropriately balances high-risk/high-return research and new knowledge generation with incremental research, while allowing for introduction of new capability, research and researchers. The Challenge gained very valuable experience through its two contestable processes in 2017 and will draw on this to ensure that there is an appropriate balance of research that builds on the best returns from investment in the current programme.

## 6. DELIVERING IMPACT |

### 6.1 A NIMBLE APPROACH

Phase 2 BBHTC activities are focused on solution building with stakeholders and end-users at local, community, regional and national scales. This will be achieved through working with stakeholders at a range of levels from specific communities of interest to the national policy-making and political levels. A multi-level approach is critical to achieving impact as housing and urban development policy, regulation and larger scale development and re-development are and will continue to be top-down driven. At the same time communities (both spatial and interests based) want more engagement with and involvement in how places important to them are developed, maintained and evolve to accommodate changing needs.

Currently, communities are often disconnected from decisions affecting them (Christchurch City Council 2016). The desire for community level action is high, but achieving community-led action is often difficult and information and understanding of how to undertake community action is absent, inconsistent, incomplete or hard to find. This was a common theme that arose during the BBHTC strategy consultation. Another common theme was that despite knowing what needs to be done, and why it is important to improve homes and spaces, and to achieve thriving communities and regions, there is a severe knowledge deficit around the “how” this can be achieved. In Phase 2 BBHTC’s science leadership, management, governance, key stakeholders, end-users and communities will work collaboratively to ensure that research continues to be impactful and does not lose relevance or currency through being taken over by events or too slow in delivery.

In Phase 2 emphasis will be given to scaling and connectivity of research findings. For example, BBHTC will support the scaling-up of successful community-level projects in much the same

way that the Sanctuaries of New Zealand (<http://www.sanctuariesnz.org/>) and the predator free movement have shown how local actions can achieve impact and be replicated with local flavour through “halo” effects. This will be achieved through mechanisms such as the communities of practice which are being developed in current Challenge research projects.

### 6.2 PATHWAYS TO IMPACT

BBHTC has five pou | pillars that the research-based, transformation pathways to impact rest on:

- Pou 1: Relevant, robust and credible research.
- Pou 2: Research processes and methods that engage with stakeholders and their world views and preoccupations.
- Pou 3: Solution-building research.
- Pou 4: Fit-for-purpose and targeted knowledge exchange.
- Pou 5: Public sharing and inspiration.

#### ***POU 1: Relevant, robust and credible research***

The Challenge has engaged skilled, best fit and committed teams of well-connected researchers (section 5), many of whom have long-term relations with stakeholders, populations and communities. These researchers are well-positioned to collaborate, co-design and co-produce relevant research and publish in internationally peer reviewed journals.

In Phase 2, the Challenge’s distinctive Tāne Whakapiripiri kaupapa, developed by Māori, has been given a wider setting and context in Pā Kāinga, in recognition of the kāinga/neighbourhood/ community settings of all of the Challenge’s research on building better homes, towns and cities. The relevance of research for Māori must be demonstrated in all projects and programmes.

Relevance, robustness and credibility of Challenge research will also be assured through the

Independent Science Advisory Panel, Governance Group expertise, science leadership team and exposure to peer and stakeholder critique through a sequence of Challenge's established research colloquia.

***POU 2: Research processes and methods that engage with stakeholders and their world views and preoccupations***

Participatory research methods have a long tradition in Aotearoa New Zealand in both kaupapa Māori research and community research. These methods prompt close engagement with stakeholders, in part because they embrace stakeholder research participants as experts in their lives, cultures and communities.

The Challenge considers that all transformational research is characterised by strong engagement. It will involve co-design and collaboration and also involve challenging taken-for-granted views among stakeholders. Essential to achieving change and transformation are researchers' abilities to question, to disagree and to pose different understandings which can nudge, stimulate paradigm shifts, or empower different and previously silenced voices.

***POU 3: Solution-building research***

In the existing concentrations of research relevant to BBHTC, there appears to be a tendency to do increasing amounts of research within the scope of relatively narrow concerns. Much of the research undertaken is also 'hidden away' in post-graduate theses and dissertations or academic journals. Therefore, BBHTC will establish a series of meta-analyses and consensus conferences bringing together researchers and stakeholders in urban governance, urban design and neighbourhoods. These will be used to establish the parameters, factors and design characteristics that the existing research platforms suggest are associated with desired outcomes.

The orientation towards solution-building will be embedded in research programmes through engagement and co-production requirements for

our strategy already described. Research-based solutions will involve identifying both radical departures from our current building, housing and regional systems, and less radical social, technical and management adaptations.

***POU 4: Fit-for-purpose and targeted knowledge exchange.***

Impact and transformational change are facilitated when:

- research knowledge is exchanged in ways that bring people with different interests, roles, positions, responsibilities and perspectives together, and/or
- research knowledge exchange is tailored to the specific needs of particular people with shared interests due to their similar positions, responsibilities and aspirations. Effective knowledge exchange can involve face-to-face engagements such as summits, colloquia and charettes, technical reports, bulletins and databases, tools or design solutions, and professional and academic journals and publications.

In Phase 2, each research programme will be assessed on how it proposes to establish and periodically review its knowledge exchange. BBHTC will support individual research programme processes with an annual Challenge colloquium, a Challenge website, a communications strategy and media support.

***POU 5: Public sharing***

The Challenge has actively promoted research findings in the media as they have come on stream. This has proved a useful way of ensuring Challenge research is contributing to public debate and awareness, measured through pick up rates of media releases and stories and approaches to BBHTC for stories and comment. It has drawn attention to BBHTC's mission and research amongst industry, central and local government, advocacy and community stakeholders. During Phase 2, the Challenge will develop a more comprehensive and strategic communication strategy and management

process to ensure that communication activities and resources are cohesive, consistent and focused on high impact areas.

### 6.3 BENEFITS TO SCIENCE AND ALL NEW ZEALANDERS

The costs of unaffordable housing, unmet housing need, dysfunctional and unhealthy housing are known to be considerable. The Challenge's dual research focus on the expansion of housing that is affordable to access, operate and sustain, located in better integrated and adaptable settlements, rohe, towns and cities, offers potential to deliver real benefits to Aotearoa New Zealand at both local and national scales.

Success will be evident in all of the country's diverse communities through increased access to affordable and culturally appropriate housing, reduction of inequality and child poverty, a revitalising of intergenerational reciprocities in the context of structural ageing, and opportunities for inclusion while celebrating Māori knowledge, innovation and kāinga.

In this way the Challenge is confident that the unique skills and analytic demands of mission-led research that brings together housing systems, building systems and local, regional and central government will deliver benefits to both science and the wider population of Aotearoa New Zealand.



Ngāti Whatua papakāinga. 'Kāinga Tuatahi', Kupe Street, Orakei



## 7. SOUND AND ENDURING DECISION-MAKING AND ACCOUNTABILITY |

### 7.1 GOVERNANCE

**No specific changes are planned for the structure of the Governance Group. This may change after an independent review of its operations and effectiveness that is scheduled for early 2019. The Governance Group had its first meeting in June 2016 and a comprehensive review makes sense after a full cycle of governance activities, including establishment, initial research investment, delivery of research findings and the mid-way strategic review.**

The Governance Group does regularly self-monitor performance. Soon after its establishment the Group adopted a Governance Group charter to promote and support high standards in the governance of the Challenge. Governance Group meetings include Governance Group only time to ensure that meetings continue to be constructive and productive; and that the Governance Group is adding value to BBHTC. The Chair of the Governance Group and the BRANZ Chief Executive review the performance of the Challenge Director annually.

The inclusion of the requirement for sound governance specific to each National Science Challenge is a feature that is not common in the broader New Zealand science system. This was a further dimension of National Science Challenges that researchers, the Governance Group and the Director have embraced to maximise the impact of BBHTC. Having two strong Māori Governors on the Governance Group ensures Māori decision making input. This model will be continued in Phase 2. Similarly, having Governance Group members with experience in senior management in the building and construction sector ensures that Challenge research is relevant and timely for industry.

Over the last two years Governance Group members have regularly engaged in BBHTC events and with research teams.

### 7.2 EFFECTIVE MANAGEMENT

The Challenge's Directorate has evolved over the last two years as BBHTC's research programme has developed and matured. The appointment of a Director Māori in 2017 (accountable to the Governance Group) strengthened Māori decision making and accountability to delivering on Vision Mātauranga, as well as the delivery of Māori science in the Challenge.

For Phase 2 we will internally review knowledge brokering in the management team. This will enhance the connections between research undertaken in the Challenge and end user uptake of science evidence (see section 6 above).

An important learning from Phase 1 is that, while it has been helpful initially to have a Māori Science Leadership Team in addition to a Science Leadership team, science leadership of BBHTC research is now at a point where there is more benefit in working together. Therefore, the Māori Science Leadership Team and the Science Leadership Team will be integrated into a single science leadership team.

The Director Māori will continue to convene three hui each year with all the Māori researchers in the Challenge to provide a Māori-only space in which issues can be raised.

### 7.3 CHALLENGE GOVERNANCE AND MANAGEMENT STRUCTURE

The governance and management structure of the Building Better Homes, Towns and Cities | Ko ngā wā Kāinga hei Whakamāhorahora National Science Challenge is summarized in Figure 4.

The Challenge Directorate is at the centre of the diagram with the governance, host, collaborating parties, Independent Science Advisory Panel and the Ministry of Business, Innovation and Employment situated above this, and the operational structures and linkages in the lower part of the diagram.

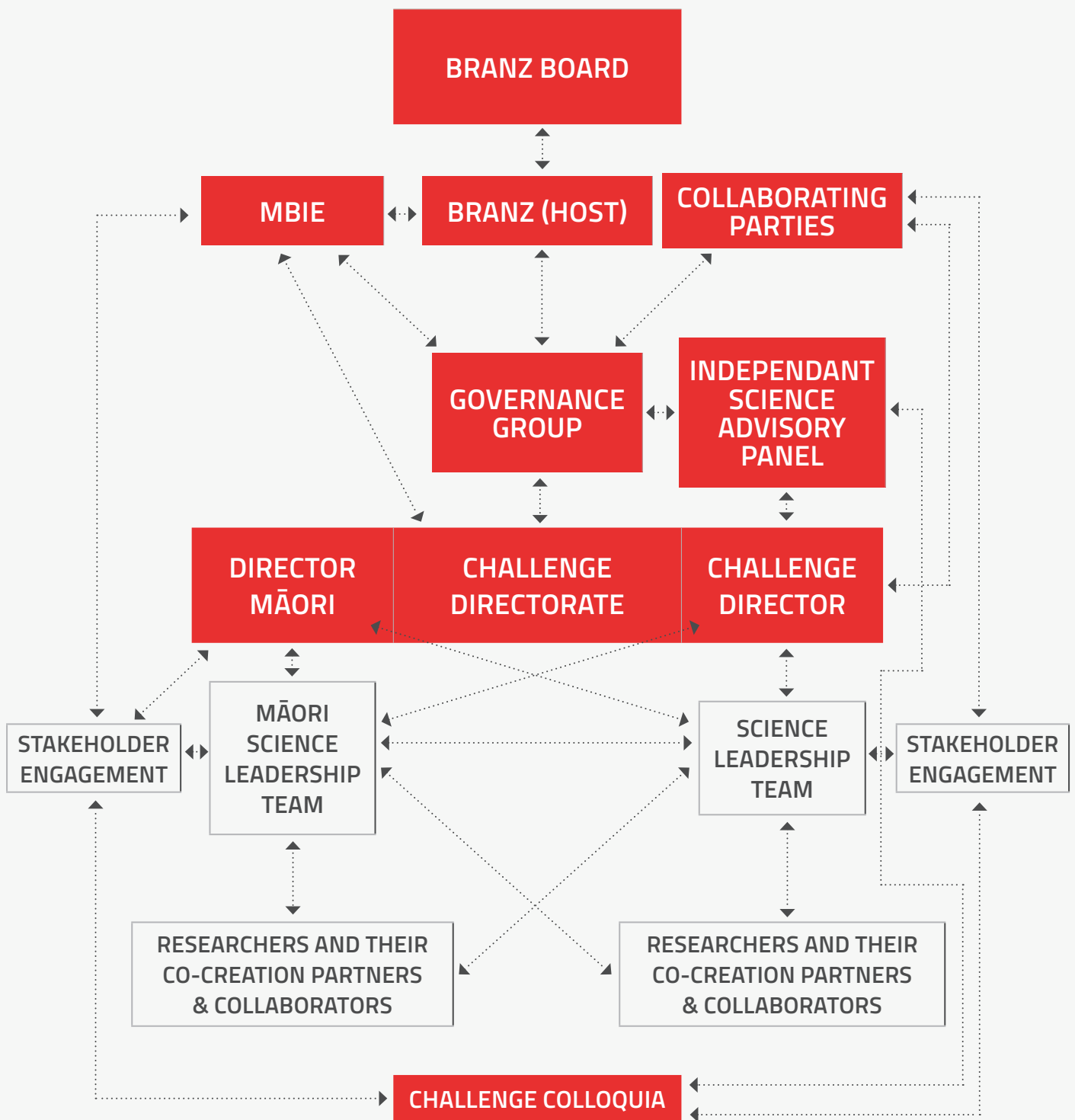


Figure 4: Challenge Governance and Management Structure

A critical feature of the structure is the web of interconnections between the various components. The Governance Group meets at least once every two months and receives regular reports from the Director, Director Māori and Challenge Manager on research activities and performance, the financial situation, and any operational matters that may be posing risks for the Challenge. Detailed minutes are kept for all meetings and these are available for review if required.

## 7.4 SUPPORTIVE HOST

As host, BRANZ supports BBHTC through the provision of corporate services that, where appropriate, are tailored to the needs of the Challenge. BRANZ marketing and communications staff support the Challenge through graphics support and profiling BBHTC in features and articles in Build magazine, a premier industry magazine published every two months. Build has a distribution list of more than 34,000.

BRANZ has included the Challenge Director in its Leadership programme and the Challenge Directorate office staff are included in the BRANZ organization-wide collaboration and communication development programme.

Preliminary discussions have commenced with the Chair of the BRANZ Board and the CEO of BRANZ about a service agreement between the host and the Challenge during Phase 2 to ensure that expectations of both parties are managed effectively.

## 7.5 ANNUAL BUDGET

An indicative annual budget for the five years 2019-2024 is provided in the next column.

A total of \$16.5 million will be available for investment in new research over the five years, giving an annual allocation of \$3.3 million. As noted in section 2.2.1 this is a smaller annual sum for investment in research that BBHTC had during the first phase of funding between July 2016 and June 2019.

## Annual Budget July 2019-June 2020 and subsequent years.

ADMINISTRATION	
Management	\$74,400
Governance	\$120,000
Challenge wide communications	\$9,600
Sub total	<b>\$204,000</b>
RESEARCH MANAGEMENT, COORDINATION AND COLLABORATION	
Research Management, coordination and collaboration	\$828,000
Communications (research)	\$180,000
Challenge events	\$60,000
Travel	\$60,000
Independent Advisory Science Panel	\$28,000
Sub total	<b>\$1,156,000</b>
CONTRACTED RESEARCH	
Contracts	<b>\$3,330,000</b>
Contingency	<b>\$100,000</b>
Total per annum	<b>\$4,790,000</b>

## 8. SCENARIO PLANNING |

**There are several areas where additional funding could support research that delivers on BBHTC's mission and objective. Only the first priority in this regard is summarized here and that relates to leveraging opportunities for research collaboration with other National Science Challenges. The additional funding sought to further this collaboration is \$2.0 million per annum – a total of \$10 million over five years.**

### 8.1 RESEARCH COLLABORATION WITH OTHER NSCS

During the development of the strategy for Phase 2 discussions between Challenge Directors and senior researchers have identified three potential areas of collaboration.

The first, and most well-developed proposal at this stage relates to ageing well through affordable homes in age-friendly neighbourhoods and regions. Affordable, functional housing and neighbourhoods have been identified as critical issues for enabling environments for older people in the stakeholder engagement carried out by senior researchers in the Ageing Well National Science Challenge. In addition, Ageing Well stakeholders are increasingly concerned with social isolation, maintaining cultural connections of older people and their knowledge, and issues of vulnerability and susceptibility to predation. The same issues have been raised during BBHTC's consultation over its research strategy and they align well with one of the funding priorities identified for Phase 2 in section 2.4. BBHTC and Ageing Well are developing a process to combine expertise in a joint project targeting these issues over the next five years.

The second relates to water in urban areas. Flooding and storms are frequent events in

Aotearoa New Zealand for which the insurance industry pays out millions of dollars in claims every year (ICNZ 2018). Many communities are also facing issues with poor water quality in streams and waterways and supplying adequate quantities of water for domestic and industrial use (Kaye-Blake et al 2014). There is an important opportunity to collaborate with the Deep South, Our Land and Water (OLW) and Resilience to Nature's Challenges NSCs to shape, build and retrofit our homes, neighbourhoods, kāinga, towns and cities to improve resilience, the quality of our environment and to rethink how we deliver services. Such a collaboration combines Deep South's expertise in understanding precipitation change over Aotearoa New Zealand, OLW's expertise in water quality and quantity, Resilience to Nature's Challenges expertise in natural hazards and BBHTC's interest in climate change impacts on the built environment and communities.

A third potential collaboration is with the A Better Start NSC addressing issues linked with affordable housing for low income families with young children. The Growing Up In New Zealand longitudinal survey is currently collecting information on children in their eighth year and a section of their interview schedule relates to housing. There is a real opportunity for researchers in BBHTC and Better Start to collaborate on innovative research into provision of culturally appropriate affordable housing for Māori and Pacific families in the wider contexts of the health and wellbeing of children in Auckland. There is interest amongst Māori researchers in both Challenges in developing a joint programme, and there is real potential in forming a new strong cross-Challenge research team to address housing need amongst Pacific families.



## 9 REFERENCES CITED |

- Apatov, E. & Grimes, A. (2017). Impacts of higher education institutions on local population and employment growth. *International Regional Science Review*. First Published March 22, 2017: DOI: 10.1177/0160017617698742.
- Ardern, J. (2017). Speech from the Throne. New Zealand Parliament, 8 November 2018. <https://www.beehive.govt.nz/speech/speech-throne-2017> (accessed 6 July 2018).
- Axelsson, P., Kukutai, T., Kippen, R. (2016) Indigenous wellbeing and colonisation. *Journal of Northern Studies*, 10(2): pp. 7-18.
- Baxter, D. & Murphy, L. (2017). Priced Out? Affordable housing in England. London: Institute of Public Policy Research. <https://www.ippr.org/research/publications/priced-out> (accessed 7 July 2018).
- Brabyn, L. (2017). Declining towns and rapidly growing cities in New Zealand: developing an empirically-based model that can inform policy. *Policy Quarterly*, 13 (June): pp. 37-46.
- Capital Strategy and SGS Economics and Planning (2007). Affordable Housing in the Bay of Plenty Region – A Solutions Study, Wellington: CHРАНZ Housing Research.
- Christchurch City Council, (2016). Public Participation in Community and City Governance and Decisionmaking Activity Management Plan. Long Term Plan 2015–2025 As amended through the Annual Plan 2016/17. Retrieved from <https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/Long-Term-Plan/ActivityManagementPlanPublicParticipationInDemocraticProcessesCityGovernanceAndDecisionMaking.pdf>
- Cochrane, W. & Pool, I. (2017). Māori in New Zealand's contemporary development. *Policy Quarterly* 13 (June): 37-46.
- Cochrane, W., Grimes, A., McCann, P., Poot, J. (2017). Spatial impacts of endogenously determined infrastructure investment. In: Shibusawa, H., Sakurai, K., Mizunoya, T., Uchida, S. (eds.), *Socioeconomic Environmental Policies and Evaluations in Regional Science: Essays in Honor of Yoshiro Higano* Singapore: Springer, pp. 227-247.
- Florida, R. (2017). *The New Urban Crisis*. London: Oneworld Publications.
- Gurran, N. & Bramley, G. (2017). *Urban Planning and the Housing Market: International perspectives for policy and practice*, London: Palgrave MacMillan.
- Gurran, N., Gilbert, C., Gibb, K., van den Nouwelant, R., James, A., Phibbs, P. (2018). *Supporting Affordable Housing Supply: Inclusionary planning in new and renewing communities*. Melbourne: Australian Housing and Urban Research Institute Ltd.
- Grimes, A. (2017). City growth and infrastructure. In: P. Howden-Chapman, L. Early, J. Ombler (eds.) *Cities in New Zealand: Preferences, patterns and possibilities*. Wellington: Steele Roberts Aotearoa, pp. 29-40.
- Insurance Council of New Zealand (ICNZ) (2018). Previous Events: Cost of natural disasters <https://www.icnz.org.nz/natural-disasters/previous-events/> (accessed 6 July 2018)
- Jackson, N. (2017). Irresistible forces: facing up to demographic change. In: P. Spoonley (ed.) *Rebooting the Regions. Why low or zero growth needn't mean the end of prosperity*. Palmerston North: Massey University Press, pp.47-78.
- Jackson, N. & Brabyn, L. (2017). The mechanisms of subnational population growth and decline in New Zealand 1976-2013. *Policy Quarterly*, 13 (June): pp. 22-36.
- James, B. & Saville-Smith, K. (2010). *Children's Housing Futures*. Wellington: CHРАНZ Housing Research.
- Johnson A., Howden-Chapman, P., Eaclub, S. (2018) *A Stocktake of New Zealand's Housing*. Wellington:

- Report for the Minister of Housing and Urban Development, New Zealand Government.
- Johnston, K., Field, L., Poston, D. (2014). More deaths than births: subnational natural increase in Europe and the United States. *Population and Development Review* 41(4): 651–680.
- Kaye-Blake, B., Schilling, C., Nixon, C. & Destremau, K. (2014). Water management in New Zealand: A road map for understanding water value. NZIER public discussion paper. Working paper 2014/01. Wellington: New Zealand Institute of Economic Research.
- Kukutai, T. (2011). Building ethnic boundaries in New Zealand: Representations of Māori identity in the census. In: P. Axelsson and P. Sköld (eds.) *Indigenous Peoples and Demography: The complex relation between identity and statistics*. New York: Berghahn.
- Lutz, W., Sanderson, W., Sherbov, S. (eds) (2004). *The End of World Population Growth in the 21st Century: New challenges for human capital formation and sustainable development*. London and Sterling VA: International Institute for Applied Systems Analysis/Earthscan.
- Mackay, M. & Perkins, H. (2017). Supporting regional settlements, *Build* 160 (June/July): pp 66–67.
- Matanle, P. (2017). Understanding the dynamics of regional growth and shrinkage in 21st century Japan: towards the achievement of an Asia-Pacific depopulation dividend. In: D. Chiavacci & C. Hommerich (eds.) *Social Inequality in Post-Growth Japan: Transformation during economic and demographic stagnation*. London: Routledge, pp. 213–230.
- MBIE (2017a). National Science Challenges. Terms of Reference for Mid-Way Reviews. Wellington: Ministry of Business, Innovation and Employment. <http://www.mbie.govt.nz/info-services/science-innovation/funding-info-opportunities/investment-funds/national-science-challenges/documents-image-library/national-science-challenge-mid-way-review.pdf> (accessed 16 June 2018).
- MBIE (2017b). Housing Affordability Measure. Wellington: Ministry of Business, Innovation and Employment.
- MBIE (2018). Vision Mātauranga Policy. Wellington: Ministry of Business, Innovation and Employment. <http://www.mbie.govt.nz/info-services/science-innovation/agencies-policies-budget-initiatives/vision-matauranga-policy> (accessed 1 July 2018).
- Meade, R. & Grimes, A. (2017). Welfare costs of coordinated infrastructure investments: The case of competing transport modes. *New Zealand Economic Papers*, 51, 2, 109–121.
- McAllister, P., Wyatt, P., Coleman, C. (2013). Fit for policy? Some evidence on the application of development viability models in the United Kingdom planning system, *Town Planning Review*, 84 (4), pp. 495–521. <https://doi.org/10.3828/tpr.2013.26>
- McAllister, P., Street, E., and Wyatt, P. (2016). Governing calculative practices: An investigation of development viability modelling in the English planning system. *Urban Studies*, 53 (11), pp. 2363–2379. <https://doi.org/10.1177/0042098015589722>
- McMillan, R. (2017). The shrinkage pathway: managing regional depopulation. In: P. Spoonley (ed.) *Rebooting the Regions. Why low or zero growth needn't mean the end of prosperity*. Palmerston North: Massey University Press, pp.213–238.
- Morgan, R. (2018). "Economic issues dominate New Zealanders concerns in early 2018" Article 7534, 16 March 2018. <http://www.roymorgan.com/findings/7534-roy-morgan-problems-facing%20new-zealand-february-2018-201803152343> (accessed June 16 2018).
- Murphy, L. (2014). "Houston, we've got a problem': The Political Construction of a Housing Affordability Metric in New Zealand. *Housing Studies*, 29(7), 893–909. <https://doi.org/10.1080/02673037.2014.915291>

- Murphy, L. (2017a). Housing affordability, urban planning and Auckland's special housing areas. In: P. Howden-Chapman, L. Early & J. Ombler (eds.) *Cities in New Zealand: Preferences, patterns and possibilities*. Wellington: Steele Roberts Aotearoa, pp. 67-78.
- Murphy, L. (2017b). Land costs and affordability. *Build*, 163 (December 2017/January 2018): 59-60.
- Murphy, L., & Rehm, M. (2016). Homeownership, asset-based welfare and the actuarial subject: Exploring the dynamics of ageing and homeownership in New Zealand. In: N. Cook, A. Davison, L. Crabtree (Eds.) *Housing and Home Unbound: Intersections in economics, environment and politics in Australia*. Abingdon: Routledge.
- Nolan, B. (2018) *Inequality and Inclusive Growth in Rich Countries: Shared Challenges and Contrasting Fortunes*. Oxford: Oxford University Press.
- Olsen-Reeder, V. Hutchings, J. Higgins, R. (eds) (2017) *Te Ahu o Te Reo Māori*. VUW Press: Wellington
- O'Meara, P. (2018) Stand-alone Ministry will help fix housing crisis – Twyford. RadioNZ News, 8 June 2018. <https://www.radionz.co.nz/news/political/359138/stand-alone-ministry-will-help-fix-housing-crisis-twyford> (accessed 6 July 2018).
- Page, I. (2015). New House Construction Quality Survey 2014. Research Report SR335. Judgeford: Building Research Association of New Zealand (BRANZ).
- Paris, C. (2007). International perspectives on planning and affordable housing. *Housing Studies*, 22(1): pp. 1-9.
- Pelzer P., Geertman S., Van Der Heijden R., Rouwette E. (2014.) The added value of Planning Support Systems: A practitioner's perspective. *Computers, Environment, and Urban Systems*, 48: pp. 16-27.
- Perry, B. (2017). Household incomes in New Zealand: Trends in indicators of inequality and hardship 1982-2016. Wellington: Ministry of Social Development.
- Pool, I. (ed.) (1985). *Population of New Zealand*. United Nations: ESCAP Country Monograph Series No. 12 (2 volumes).
- Pool, I. (1991). *Te Iwi Māori: population, past, present and projected*. Auckland: Auckland University Press.
- Pool, I. (2015a). *Colonisation and Development, New Zealand, 1769-1900: The seeds of Rangitarea*. Cham, Switzerland: Springer.
- Pool, I. (2015b). The demographic implications of immigration. *New Zealand Population Review* 41: pp. 45-68.
- Pool, I. (2016). Population replacement, national building, population policy. *New Zealand Population Review* 42: pp. 43-65.
- Pool, I. (2017). New Zealand's population and development path. *Unravelling the 'when', 'how' and 'why'*. *Policy Quarterly* 13 (June): 10-21.
- Pool, I., Dharmalingam, A. and Sceats, J. (2007). *The New Zealand Family since 1769: A demographic history*. Auckland: Auckland University Press.
- Productivity Commission (2012). *Housing Affordability Inquiry*. Wellington: Productivity Commission.
- Rae, D. & Thompson, E. (2017). *The Impact of Rising House Costs on Accommodation Supplement Recipients*. Wellington: Ministry of Social Development.
- Roaf, S., Crichton, D., Nicol, F. (2016). *Adapting Buildings and Cities for Climate Change*. (2nd edn.). London: Routledge.
- Saville-Smith, K. (2016). *SRA development: Making the architecture of decisions work for better homes, towns and cities – SRA 1*. Report for Building Better Homes, Towns and Cities National Science Challenge. Wellington: CRESA.
- Saville-Smith, K. (2017a). Thinking about the logics of affordable new build delivery: Some preliminary thoughts on the structural position of different types of new-builders. Report for Building Better Homes, Towns and Cities National Science Challenge. Wellington: CRESA

- Saville-Smith, K. (2017b) Investing in affordable homes. *Build*, 163 (December 2017/January 2018): 56-58.
- Saville-Smith, K. (2018) Revitalising the production of lower value homes: researching dynamics and outcomes. Paper presented at the European Network for Housing Research (ENHR) 2018 Conference, Uppsala, June 26-29.
- Saville-Smith, K. Witten, K., James B., Opit S. (2018) Landscape of Research Relevant to BBHTC Mission: A Report of Research Funding, Outputs and Post-Graduate Work Since 2012, Wellington: CRESA, SHORE Massey University, and Public Policy & Research.
- Saville-Smith, K., Saville-Smith, N., B. James (2016). Community Housing Providers, Procurement and the Building Industry. Research Report ER21. Judgford: BRANZ.
- Schindler M., Dionisio R. & Kingham S. (2018). A multi-level perspective of a spatial data ecosystem: needs and challenges among urban planning stakeholders in New Zealand. *International Journal of Spatial Data Infrastructure Research*, Vol 13. (Under Review).
- Simmonds, N., Kukutai, T., Ryks, J. (2017). Here to stay: reshaping the regions through mana Māori. In: P. Spoonley (ed.) *Rebooting the Regions. Why low or zero growth needn't mean the end of prosperity*. Palmerston North: Massey University Press, pp.79-106.
- Spoonley, P. (2017). Diverging demographics and economies. In: P. Spoonley (ed.) *Rebooting the Regions. Why low or zero growth needn't mean the end of prosperity*. Palmerston North: Massey University Press, pp.17-46.
- Spoonley, P. & Bedford, R. (2012). *Welcome to Our World? Immigration and the reshaping of New Zealand*. Auckland: Dunmore Press.
- Springler, E. (2014). Theories of Regional Development and Implications for the Housing Market. In: G. Bischof (ed). *Regional Economic Development Compared: EU-Europe and the American South*, Innsbruck: Innsbruck University Press.
- Stevens D., Dragicevic S., Rothley K. (2007). iCity: A GIS-CA modelling tool for urban planning and decision-making. *Environmental Modelling & Software* 22: pp. 761-773.
- Studio Partington (2018). *Futurology: The new home in 2015*. Milton Keynes: NHBC Foundation.
- UKGBC (2018). *Social Value in New Development: An introductory guide for local authorities and development teams*. London: UK Green Building Council.
- Wane, J. (2018). Saying goodbye to the city. *North & South*, June: 30-39.



*Ki te kotahi te kakaho ka whati,  
ki te kapuia e kore e whati*

*Alone we can be broken  
Standing together, we are invincible*

---

## CONTACTS

The head office for the Building Better Homes, Towns and Cities National Science Challenge is located at BRANZ.

### BRANZ

Office: Moonshine Road, Judgeford, Porirua  
City 5381, New Zealand

Post: Private Bag 50 908, Porirua 5240,  
New Zealand

Email: [buildingbetter@branz.co.nz](mailto:buildingbetter@branz.co.nz)

Web: <http://www.buildingbetter.nz>