
National Construction Pipeline Report 2017

A Forecast of Building and Construction Activity

5th Edition



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI



Pacifecon
Building intelligence

ABOUT THIS REPORT

Published July 2017

By Ministry of Business, Innovation
and Employment

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ISBN 978-1-98-853506-7 (print)
ISBN 978-1-98-853507-4 (online)

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1 Introduction

1.1 Overview

The National Construction Pipeline Report 2017 (the report) was commissioned by the Ministry of Business, Innovation and Employment (MBIE) and jointly prepared by Pacifecon NZ Ltd (Pacifecon) and BRANZ. [The Productivity Partnership](#)¹ commissioned the first report in 2013; this report is the fifth edition.

The report provides a forward view of national construction activity for the next six years, ending on 31 December 2022. It includes graphs, tables and commentary on actual and future building and construction work, based on building and construction forecasting by BRANZ, and Pacifecon data on known non-residential building and infrastructure² intentions.

1.2 Purpose and Content

The report aims to provide a pipeline of forward building and construction work, to assist in:

- planning by all participants in the sector
- scheduling of investment in skills and capital, and
- coordination between construction procurers (particularly central and local government) that can lead to better scheduling of construction projects.

These improvements could moderate the *boom-bust*³ cycles that have negative impacts on productivity, employment, skill levels and quality in the construction sector.

The report includes:

- a summary of the report's [key findings](#)
- [national](#) and [regional](#) forecasts of construction values and dwelling consents, and
- a [comparison](#) of this year's forecasts against last year's.

The report includes the following improvements:

1. Separation of all non-residential construction into non-residential building and infrastructure at both the national and regional level.
2. An analysis of residential building consent data for average floor area (m²) of building types, nationally and regionally from 1992-2016.
3. A table of dwelling forecast numbers in [Appendix F](#).

Your feedback is welcome at feedback.pipeline@mbie.govt.nz

¹ Words [underlined in blue](#) are links through to specific sections of the report.

² Infrastructure was termed 'other construction' in previous pipeline reports.

³ Words, and terms in *blue italics* are links through to a definition in Appendix B.

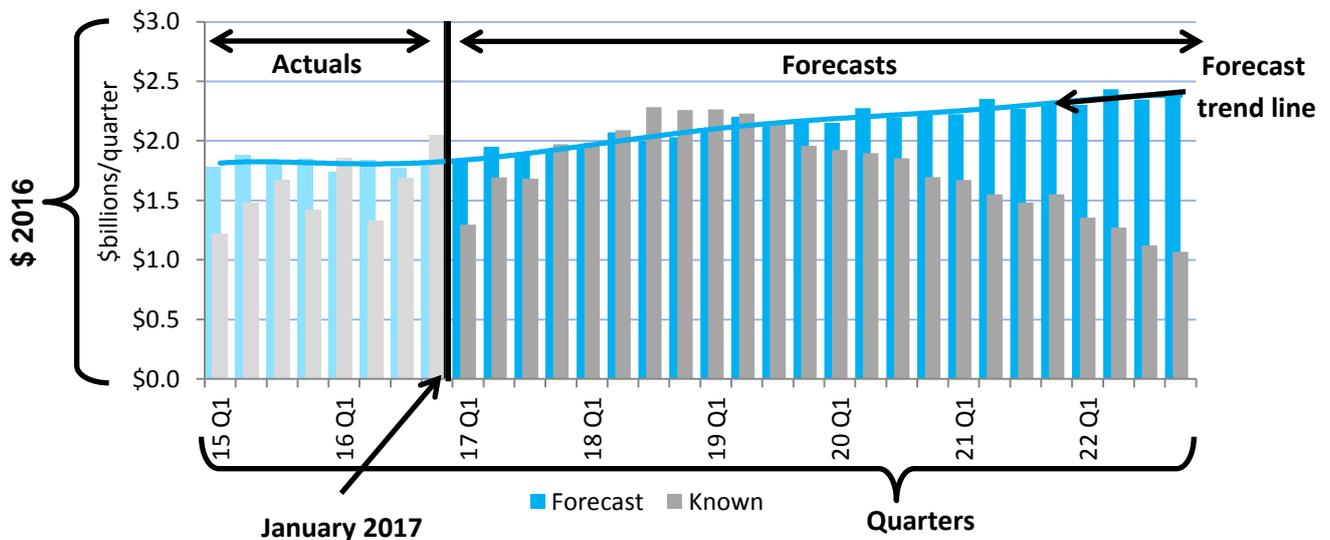
1.3 Units of measurement

Value in the report is based on Statistics NZ's *gross fixed capital formation* series, a subset of *gross domestic product*. Gross fixed capital formation values are forecast for residential buildings, non-residential buildings and other construction (infrastructure). This represents the total value of the buildings and other assets produced, this value is more inclusive than building consent values. A further explanation of gross fixed capital formation and methodology can be found in [Appendix C](#).

1.4 Understanding the graphs and data

Different types of graphs are used in this report to illustrate relevant information. The key features of the graphs are discussed below using the following example.

Figure 0-1 Example Graph



Source: Pacifecon / BRANZ

- Values are in constant December 2016 dollars and are expressed in \$billions per quarter or per year, unless otherwise stated; ie inflation has been removed from all dollar values.
- *Known projects* refer to construction project intentions recorded by Pacifecon, and based on expected construction costs over time for these projects. It is an extensive but will not be a complete list of construction intentions in New Zealand.
- *Years* are calendar years; the twelve months beginning January.
- Where rolling years are used, each point on the graph represents the total of the 12 months immediately preceding that point; eg 2017 Q2 represents July 2016 – June 2017.
- *Quarters* are of the calendar year referred to; eg 1 April to 30 June 2017 is 2017 Q2.
- *Actuals* are actual values from official statistics.
- The year beginning January 2015 is the base year for the actual data in the report. A vertical line on the graphs indicates the start of a forecast. Actuals are to the left of the vertical line and are shown in a lighter shade of colour.
- The forecast period is for six years from 1 January 2017 to 31 December 2022.
- Trend lines have been included to indicate the general direction of the forecasts.

2 Key findings

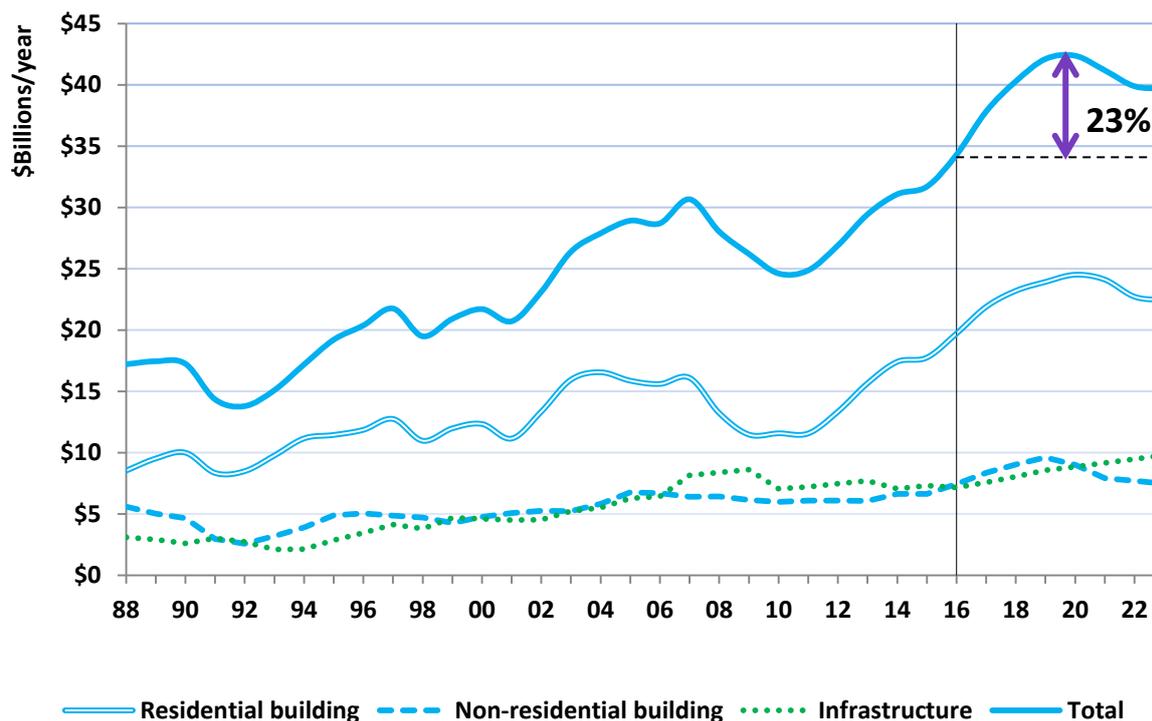
This section discusses the six most significant findings in the report:

1. The national building and construction forecast shows a higher peak with a longer duration than previously forecast
2. Dwelling unit consents are forecast to reach a new peak for the next five years
3. Growth in non-residential buildings is forecast to continue for longer and to a higher level than previously forecast
4. Growth in building and construction in Auckland is expected to be sustained for a longer time than in other regions
5. Dwelling consents in the Rest of New Zealand grew 27% in 2016, and
6. House sizes have plateaued and decreased in some regions in the last decade

2.1 The national building and construction forecast shows a higher peak with a longer duration than previously forecast

The levels of recorded national activity grew 8% to \$34b in 2016. Another 23% growth is now forecast over the next four years, to a high level of \$42b in 2020. The 2016 report had forecast a shallower \$37b peak in 2017.

Figure 2-1 All building and construction nationally, by value

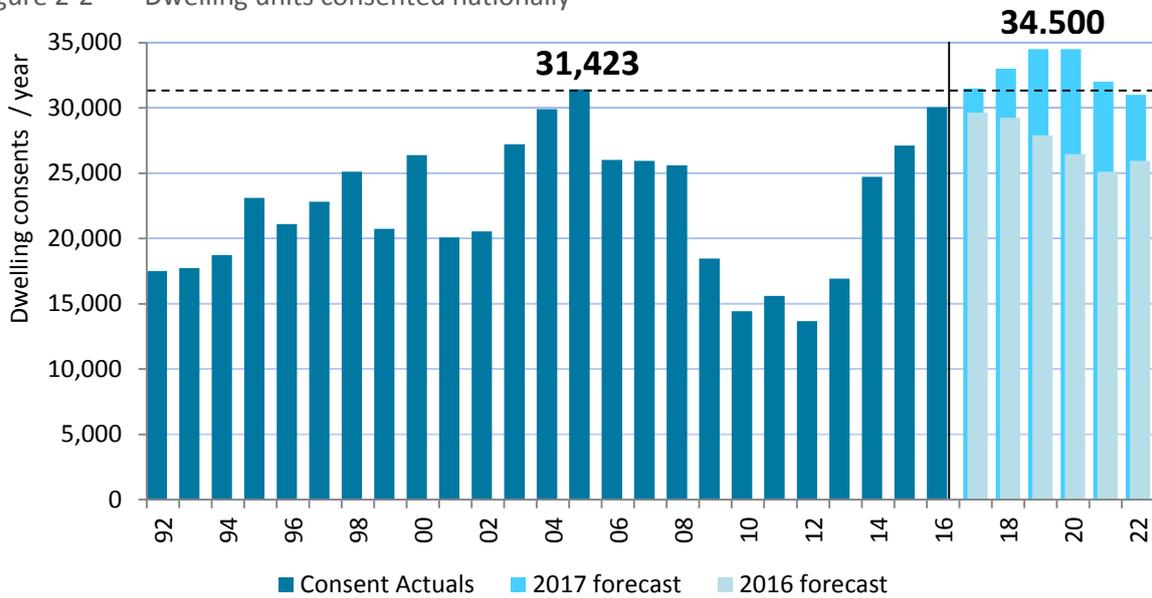


Source: BRANZ / Pacifecon

2.2 Dwelling unit consents are forecast to reach a new peak for the next five years.

It is likely the number of dwelling units consented nationally will exceed the 2004 peak of 31,000 this year and continue to do so for the next five years, reaching a peak of 34,500 dwelling units annually in 2019 and 2020. This growth was not forecast in the 2016 report.

Figure 2-2 Dwelling units consented nationally

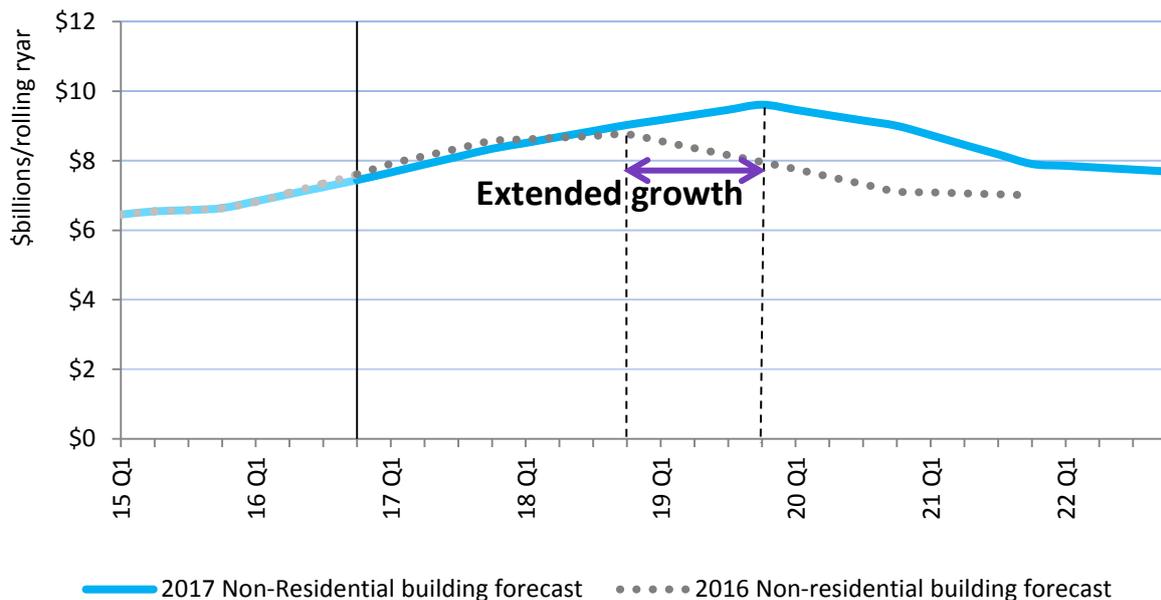


Source: Statistics NZ / BRANZ

2.3 Growth in non-residential buildings is forecast to continue for longer and to a higher level than previously forecast

Non-residential building activity in 2016 grew 12%, as forecast in the 2016 report. We are now forecasting another 29% growth to a higher level of \$9.6b in 2019.

Figure 2-3 Non-residential building nationally 2016 and 2017 forecasts compared

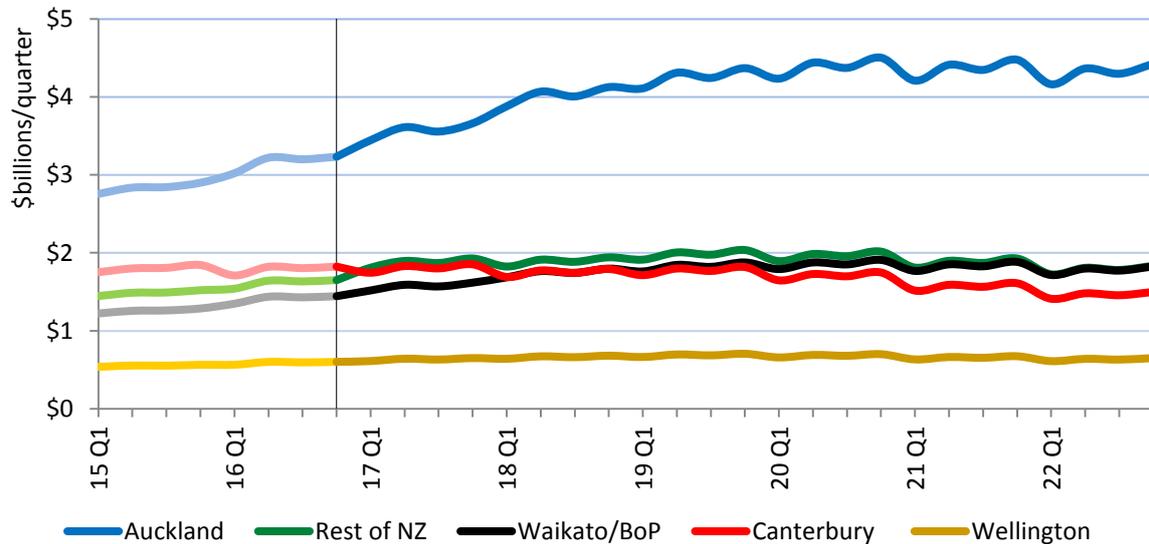


Source: Pacifecon / BRANZ

2.4 Growth in building and construction in Auckland is expected to be sustained for a longer time than in other regions.

It is expected that the level of building and construction activity in Auckland will remain at a high level for several years after the peak. Auckland's growth is expected to continue after it has eased in other regions.

Figure 2-4 Value of all building and construction by region

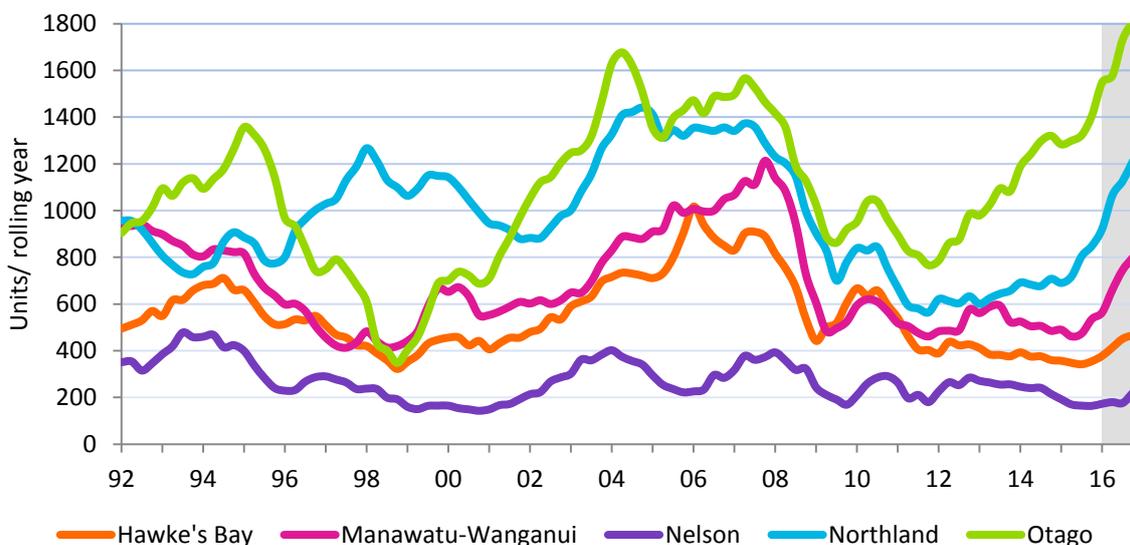


Source: BRANZ

2.5 Dwelling consents in the Rest of New Zealand grew 27% in 2016

Five of the regions within the Rest of New Zealand experienced over 27% growth in 2016. Manawatu-Wanganui increased 49% to 800 dwellings, Northland 43% to 1200 dwellings, Nelson 34% (220) and Hawke's Bay 32% (470). Otago increased 29% to 1,800 dwellings, surpassing the previous 2006 peak of 1,600, having experienced strong growth since 2012.

Figure 2-5 Residential dwellings units consented, per year (5 highest growth regions within the Rest of New Zealand region)

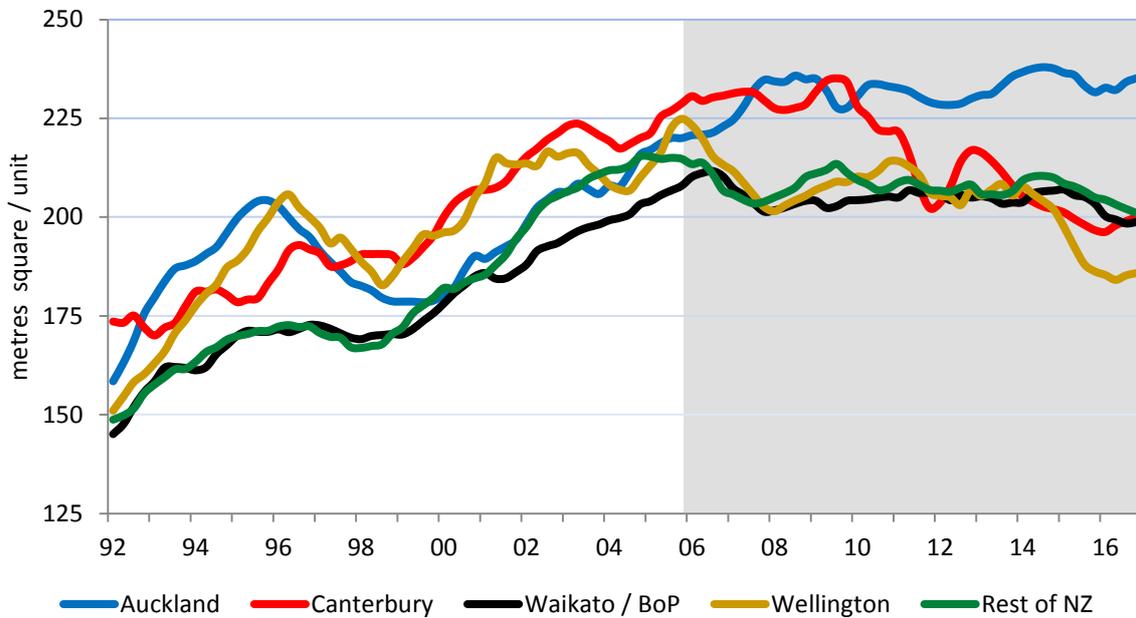


Source: Statistics NZ

2.6 House sizes have plateaued and decreased in some regions in the last decade

In most regions, the average floor area of houses (detached dwellings) has stayed the same since 2006; however, in Canterbury and Wellington, average floor areas have decreased in the last decade. Canterbury decreased from 230m² to 200m², and Wellington from 220m² to 185m².

Figure 2-6 Average detached dwelling floor area, regionally (1992-2016)



Source: Statistics NZ

3 National Forecast

In this report, building and construction is split into three activity types:

- *residential building* – detached and multi-unit dwellings
- *non-residential building* – structures of a building type (vertical), other than residential; and
- *infrastructure* – structures of a non-building type (horizontal) eg roads, subdivisions, infrastructure and civil works. Infrastructure projects do not typically require a building consent.

This section includes national forecasts for each activity type, and also discusses:

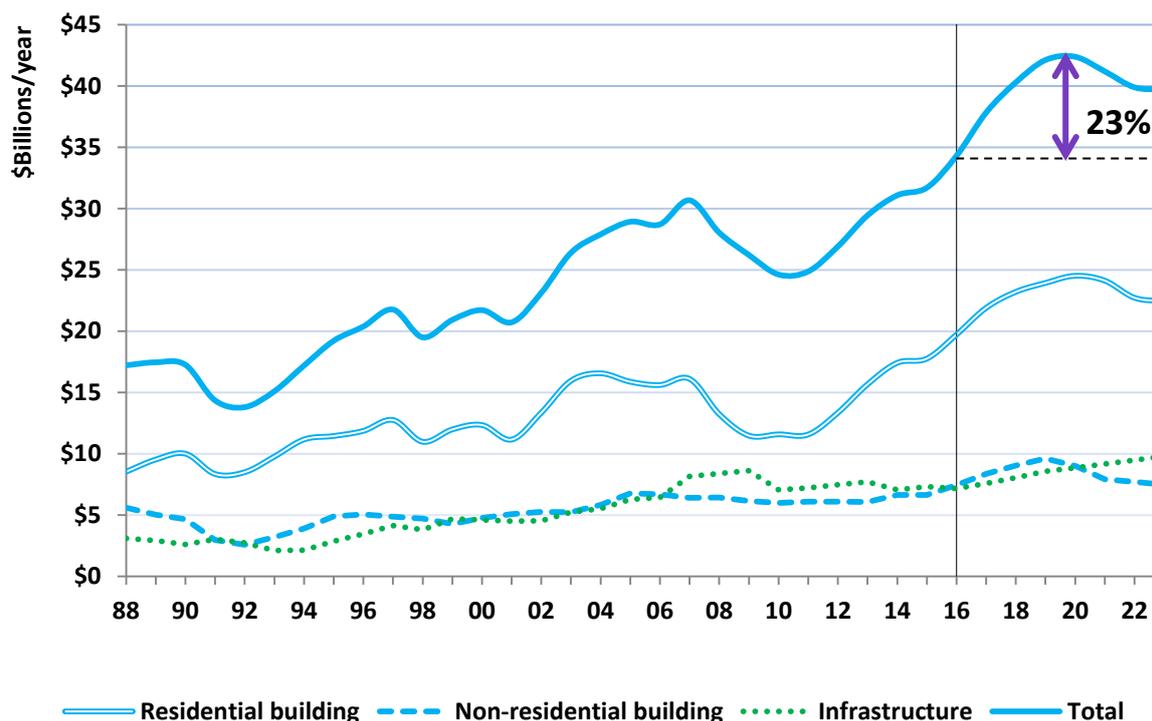
- the different types of non-residential building and infrastructure
- regional comparisons, and
- historic trend data on average dwelling unit floor area for residential dwelling units.

3.1 National construction, by value

The national forecast shows a higher peak with a longer duration than previously forecast.

New Zealand continues to construct more by value than ever before with recorded construction activity reaching \$34b for 2016 and a continuation of this growth is forecast. Value increased by 8% in 2016, and is expected to grow another 23% to a peak of \$42b in 2020.

Figure 3-1 All construction nationally, by value

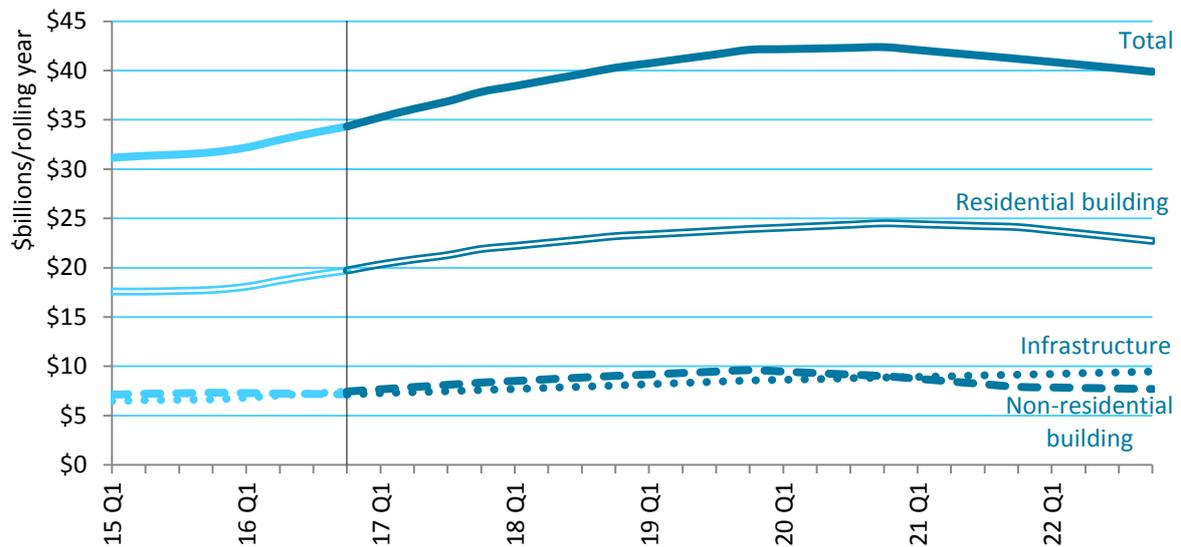


Source: BRANZ / Pacifecon

3.2 National construction, by activity type

- residential building accounts for most of the growth in all construction, with a forecast peak of \$25b in 2020,
- growth is also forecast for non-residential building with a peak of \$9.6b in 2019, and
- infrastructure gradually increases in value throughout the forecast period to \$9.5b in 2022.

Figure 3-2 All construction nationally, by activity type

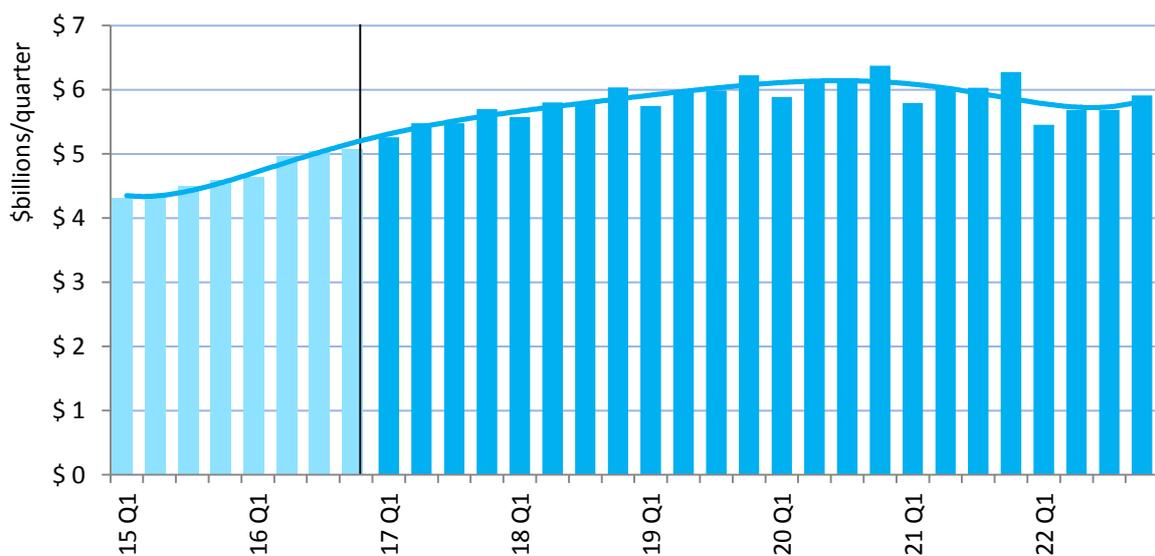


Source: BRANZ / Pacifecon

3.3 National residential building, by value and dwelling number

Last year we had forecast residential building value to peak at \$21b in 2017, but we now expect residential building value to increase to a higher value and for longer: Residential value increased by 11% in 2016, and is expected to increase 24% more before levelling out in 2020 at around \$25b.

Figure 3-3 Residential building nationally, by value

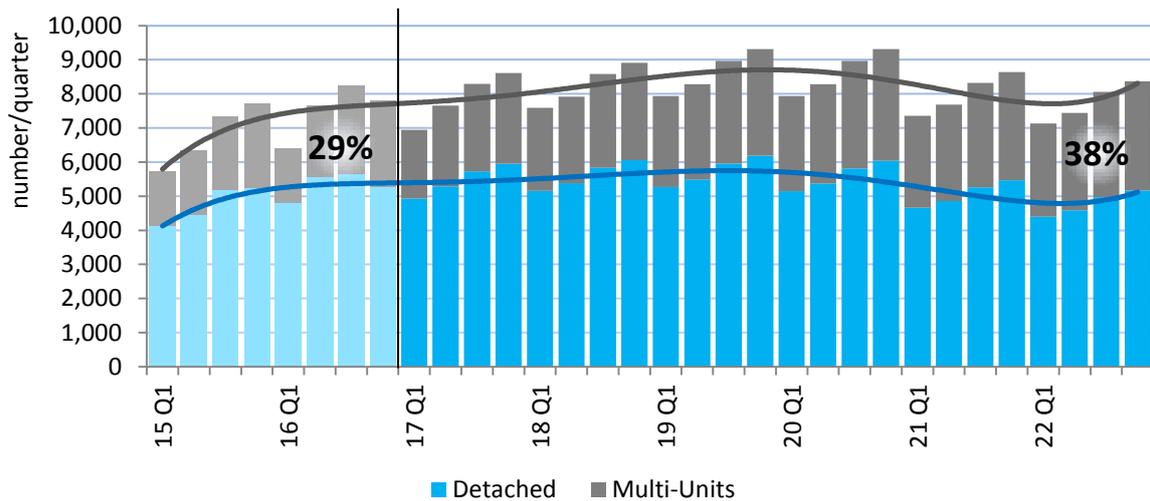


Source: BRANZ

3.4 National residential building, by dwelling number

Multi-unit housing represented 29% of all dwelling units consented in 2016, and is expected to steadily increase its share to 38% of all residential dwellings in 2022. Nationwide dwelling units consented grew 11% to 30,000 in 2016. This is forecast to increase by 15% before levelling out at 34,500 units per year in 2019. It is likely the number of dwelling units consented nationally will exceed the 2004 peak of 31,000 units this year, and continue to do so for the next five years.

Figure 3-4 Dwelling units consented nationally⁴



Source: BRANZ

⁴ A table of annual total dwelling units actual and forecast is provided in [Appendix F](#).

3.5 Residential dwelling size consent data

Analysis of historical consent data for the different types of dwelling average floor area (m²) has been undertaken this year. Statistics NZ groups dwelling consent data into four types:

- *detached dwellings* – a stand-alone dwelling unit that is not attached to any other dwelling unit, ie a typical house on its own section.
- *townhouses*⁵ - side-by-side units, such as terraced housing, townhouses, flats and units.
- *apartments* - an apartment is defined as any dwelling with another dwelling above or below it, or attached to a commercial building.
- *retirement units*⁶ - dwellings specifically for retirement purposes, from detached dwellings to apartments and rooms in retirement villages.

Average dwelling unit floor area⁷ nationally, by type

Detached dwellings and townhouses have reasonably consistent size data, indicating a trend for detached dwellings having larger floor areas. Large residential building projects are often consented in stages, making the area / unit data less consistent for apartments and retirement units, which tend to be closer to the size of townhouses than detached dwellings.

Figure 3-5 Average unit size⁸ nationally, by dwelling type (1992-2016)



Source: Statistics NZ

3.6 National non-residential building and infrastructure

In this year's report, for the first time, non-residential building and infrastructure have been forecast at a national and regional level.

⁵ Statistics NZ category 'Townhouses, flats, units and other dwellings', referred to as Townhouses in this Report.

⁶ Statistics NZ category 'Retirement village units', referred to as Retirement units in this Report.

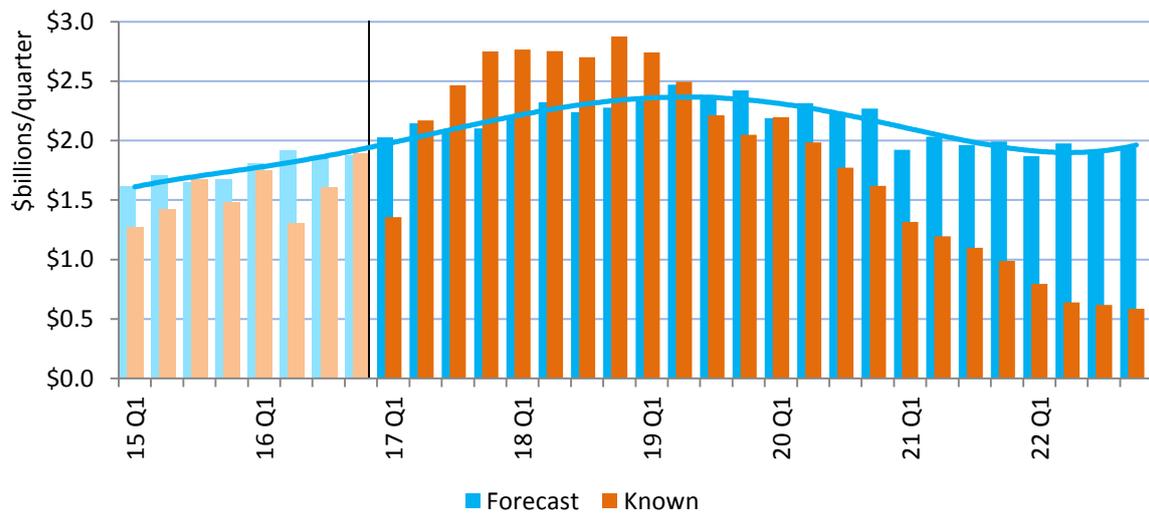
⁷ Floor area recorded on building consent also includes common areas of the building, ie foyer, hallways and lifts.

⁸ Statistics NZ base data has been used, with rolling 12 month totals to smooth the data. Total area recorded for the rolling year was divided by total dwelling unit numbers for the rolling year.

3.7 National non-residential building

The value of *non-residential building* increased by 12% in 2016, and is forecast to increase by another 29% to a high of \$9.6b in 2019. Non-residential building activity in Canterbury is expected to have reached peak levels, but growth is expected in all other regions. The level of known projects intentions from the Pacifecon database are particularly high for the next few years for non-residential building projects nationally, indicating a large value of work expected during this time.

Figure 3-6 Non-residential building activity nationally



Source: BRANZ / Pacifecon

Financially significant national non-residential building projects over the next six years include:

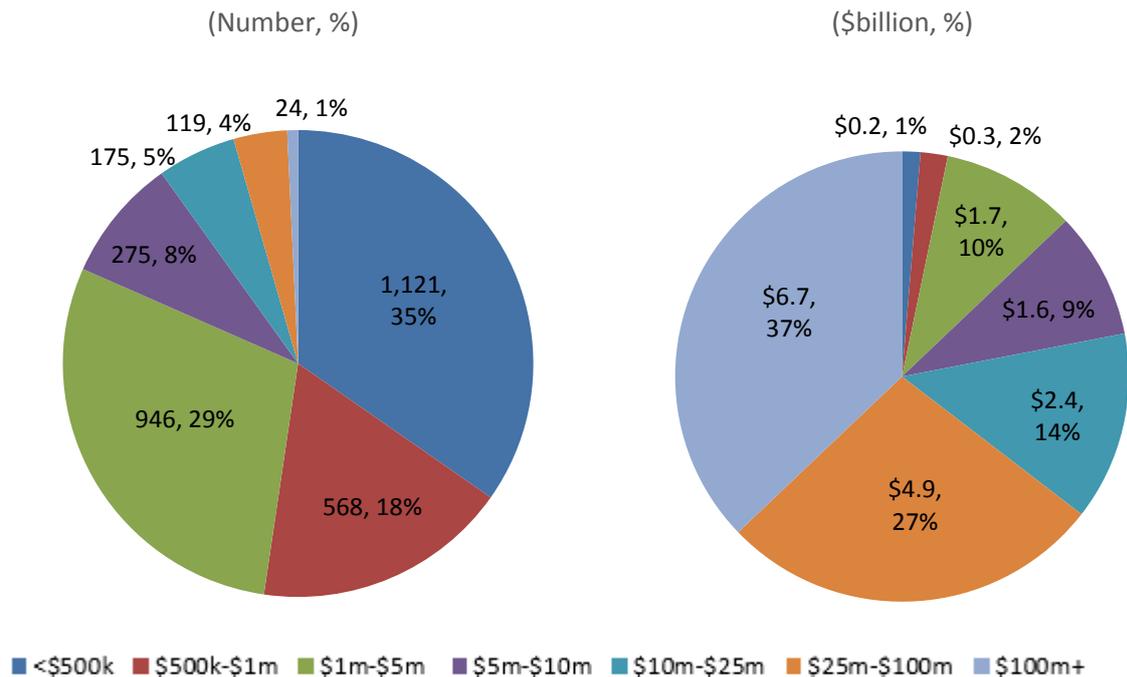
- Canterbury rebuild and earthquake strengthening
- mixed use developments (mixtures of residential, retail, office and parking)
- industrial buildings, eg milk processing and timber plants, and
- construction for offices, education, retail and tourist accommodation.

Source: Pacifecon

3.8 Distribution of the value of work for non-residential building

There are 24 projects⁹ valued \$100m and over that represent 1% of the 3,200 non-residential building projects intending to start construction between January and December of 2017. These projects account for \$6.7b, 37% of the total value. In contrast, 82% or 2,635 non-residential building projects are valued \$5m and under and total \$2.3b, representing 13% of the total value for non-residential building in 2017.

Figure 3-7 Value bands of non-residential building projects anticipated to start in the year to December 2017, by number of projects and value



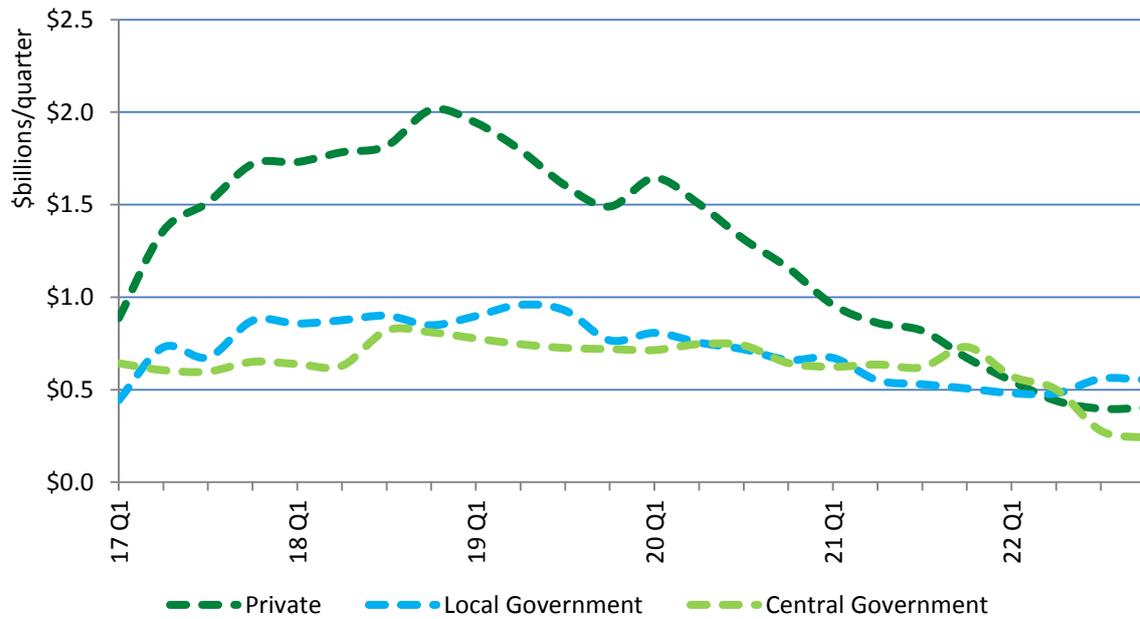
Source: Pacifecon

⁹ See [Appendix D](#) for a list of projects with a value of about \$100 million and over, likely to start in the year to 31 March 2018.

3.9 Project Initiators for non-residential building by sector

The private sector represents about a half of the non-residential building intentions for 2017, with local and central government representing about a quarter each. Non-residential building intentions for local and central government have good project visibility out to 2022; private sector building intentions fall away around 2020, due to less project visibility for privately funded projects. All sectors' non-residential building intentions are higher for 2018 than for 2017.

Figure 3-8 Value of all known non-residential building, by sector and start date



Source: Pacifecon

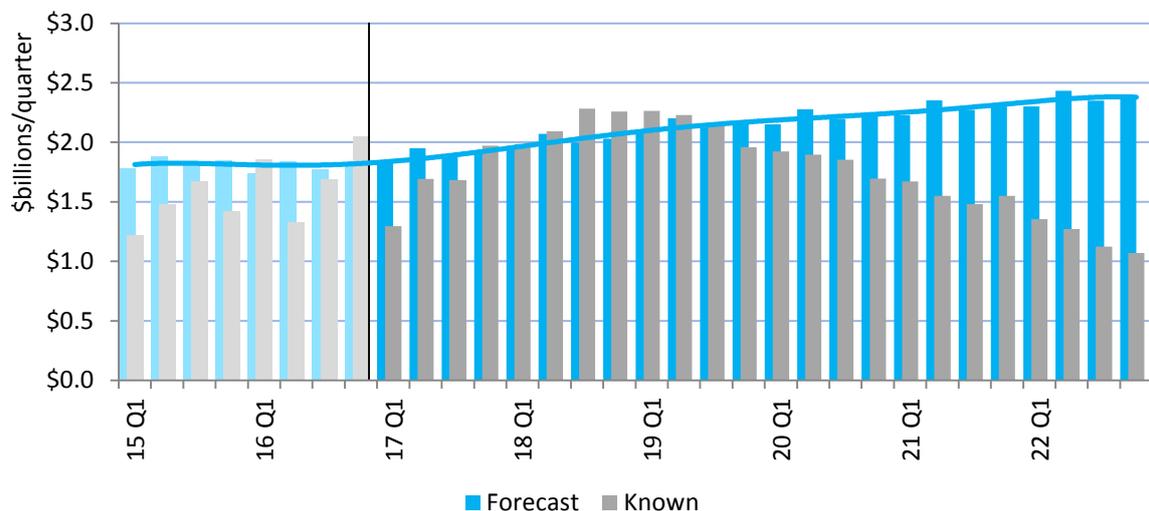
3.10 National infrastructure activity

National *Infrastructure* activity represents about a quarter of all building and construction by value for 2016 (see figure 3-2). It covers all construction that is not a building, including:

- transport - roads, rail, bridges, tunnels, runways, harbours, marinas, parking, lighting
- ground works - residential, commercial and industrial subdivisions
- amenities - telecommunications, water and energy services
- mining and energy - wind, thermal, hydro, oil, gas, and
- heavy and civil - parks, landscaping, landfills, dredging /flood control.

The value of infrastructure activity for 2016 decreased by 2.3% to \$7.2b; it is, however, forecast to increase an average of 4.5% a year for the next 6 years to reach \$9.5b in 2022. Growth is expected for all regions including Canterbury with the November 2016 Kaikoura earthquake repair activity underway. The Pacifecon data for known intentions expects a large number of projects to commence in 2018.

Figure 3-9 Infrastructure activity nationally



Source: BRANZ / Pacifecon

Financially significant national infrastructure projects over the next six years include:

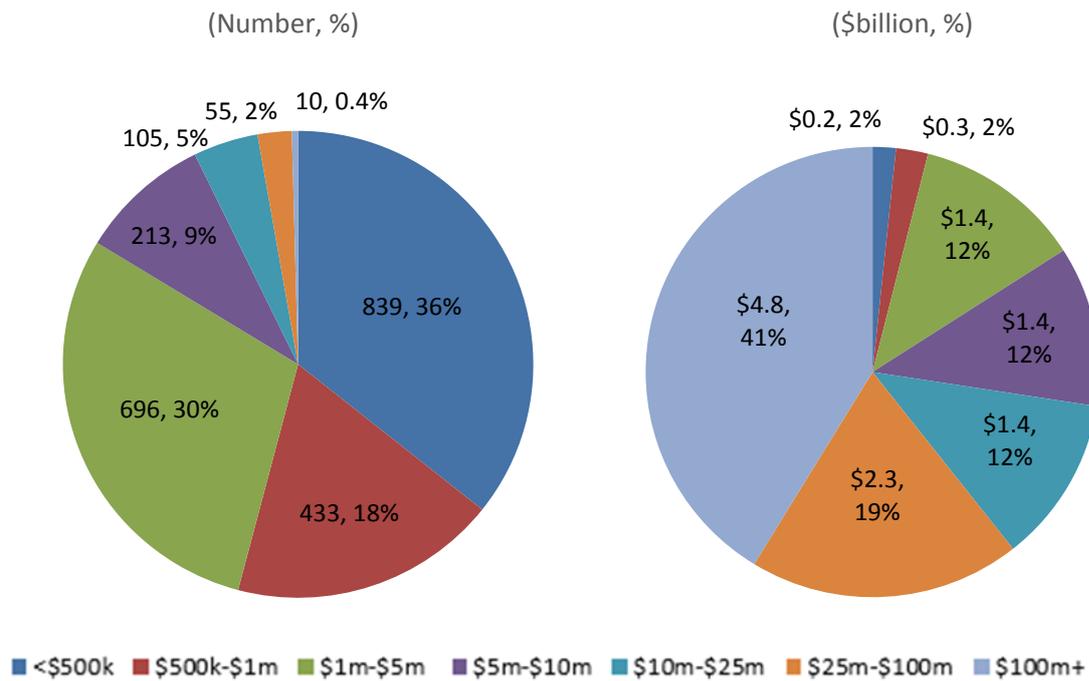
- transport projects, eg roads of national significance, Auckland City Rail Link
- Kaikoura earthquake related civil work, and
- water and wastewater projects.

Source: Pacifecon

3.11 Value of work distribution for infrastructure projects

There are 10 projects¹⁰ valued \$100m and over, scheduled to start in the year to December 2017. These 10 projects make up 0.4% of the 2,400 known infrastructure projects, but account for 41% (\$4.8b) of the total value. In contrast 84% of all infrastructure projects are valued \$5m and under representing 16% (\$1.9b) of the total value for 2017.

Figure 3-10 Value bands of infrastructure projects anticipated to start in the year to December 2017, by number of projects, and by value



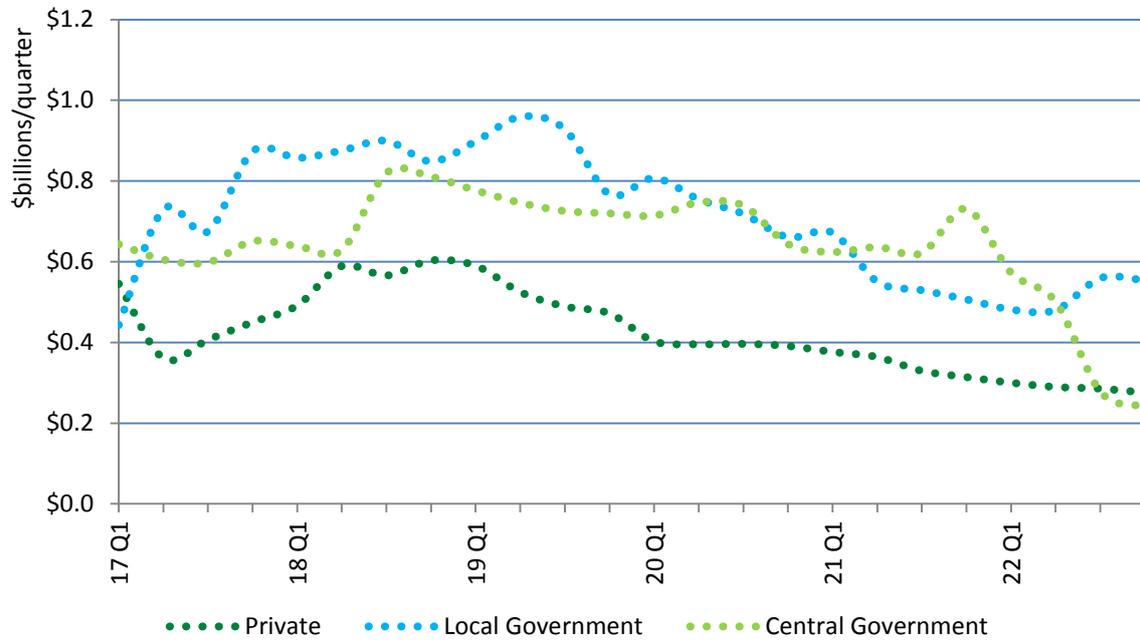
Source: Pacifecon

¹⁰ See [Appendix D](#) for a list of projects with a value of about \$100 million and over, likely to start in the year to 31 March 2018.

3.12 Project Initiators for infrastructure projects by sector

Local and central government initiate more infrastructure projects than the private sector. The infrastructure project intentions are more variable than the non-residential building intentions, possibly a result of fewer high value projects.

Figure 3-11 Value of all known infrastructure projects, by sector and start date

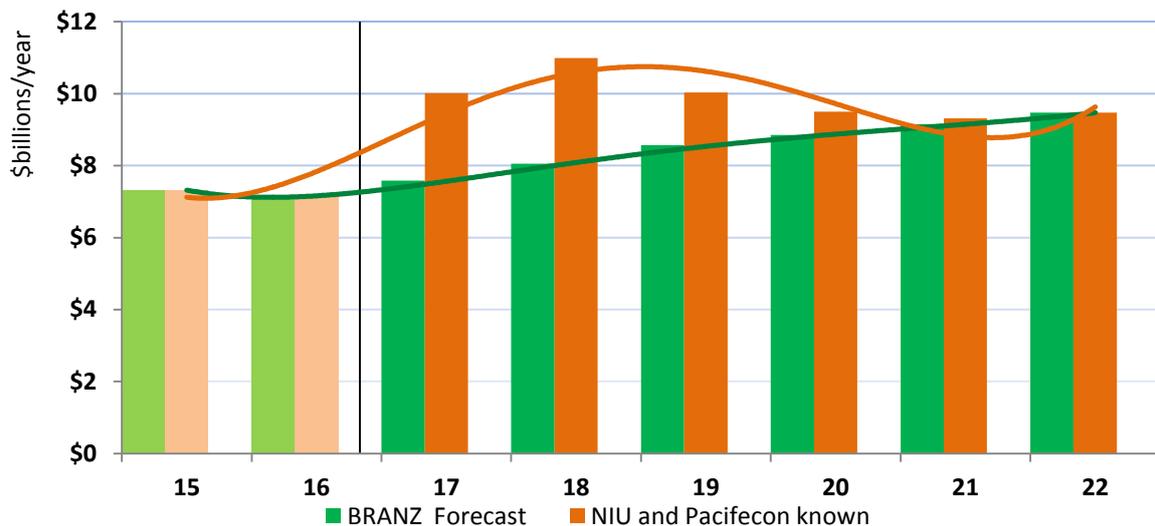


Source: Pacifecon

3.13 Comparing Pacifecon known projects with the National Infrastructure Unit's evidence base

For forecasting infrastructure, the report uses Pacifecon's database of known intentions, complemented by the *National Infrastructure Unit's* (NIU) evidence base¹¹, to support the BRANZ economic forecast. We have further developed our methodology for forecasting infrastructure, including providing forecasts at the regional level.

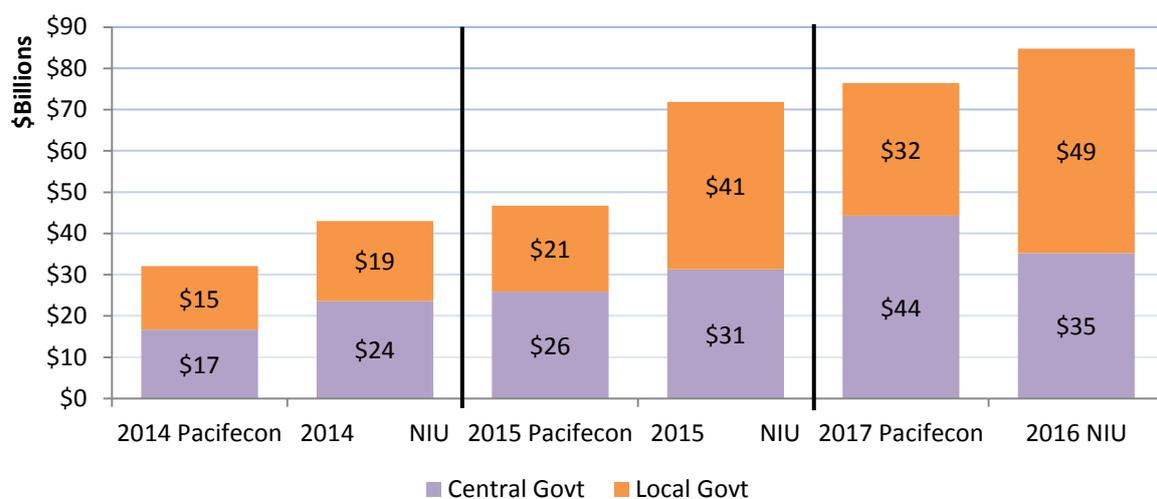
Figure 3-12 Comparison of BRANZ forecast for other construction with NIU and Pacifecon data



Source: BRANZ / Pacifecon / NIU

The NIU published the first cross sector infrastructure evidence base in February 2014 and updates to this evidence base in March 2015 and October 2016. The NIU's data includes central and local government's best view of future infrastructure spending at the time, often subject to approval requirements. Once an intention is more clearly defined it is likely to be included in Pacifecon's known project data set. The growth of intentions is clear in both datasets.

Figure 3-13 Comparison of NIU and Pacifecon datasets



Source: Pacifecon / NIU

¹¹ Inclusion of a project does not mean that it has been funded, approved, or will proceed; or, if it does proceed, it will be to the scale and timeframe indicated in this report. It is, however, the best available picture at this time.

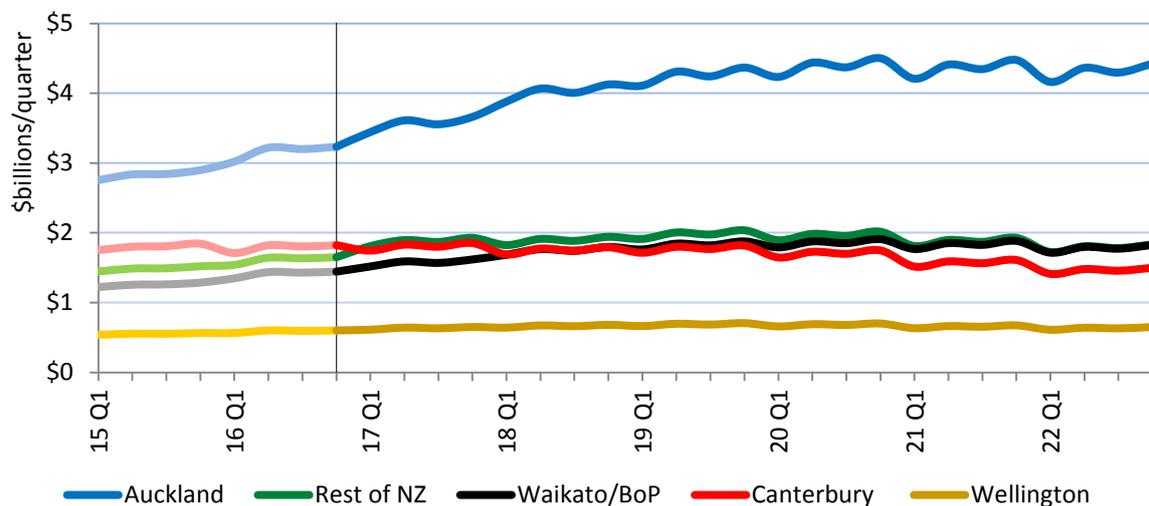
3.14 Regional comparisons

This section considers the differences in all projected construction projects across the regions. The regions are discussed individually in [Section 4](#).

The Waikato / Bay of Plenty led the way in growth in value of all construction in 2016 with 13%. Auckland was not far behind with 12%, followed by the Rest of New Zealand at 8.8% and Wellington with 6.9% growth. Canterbury, having reached the peak in rebuild activity in 2014, recorded a 0.6% decrease in 2016.

Auckland and the Waikato / Bay of Plenty are forecast to see significant sustained growth to 2020, with 38% and 31% respectively, levelling out at these high levels through to the end of the forecast in 2022. The Rest of New Zealand and Wellington are expected to grow by 23% and 16% respectively, to a peak in 2019. Canterbury is expected to remain around current levels to 2019 then slowly reducing to 2022.

Figure 3-14 Value of all building and construction by region



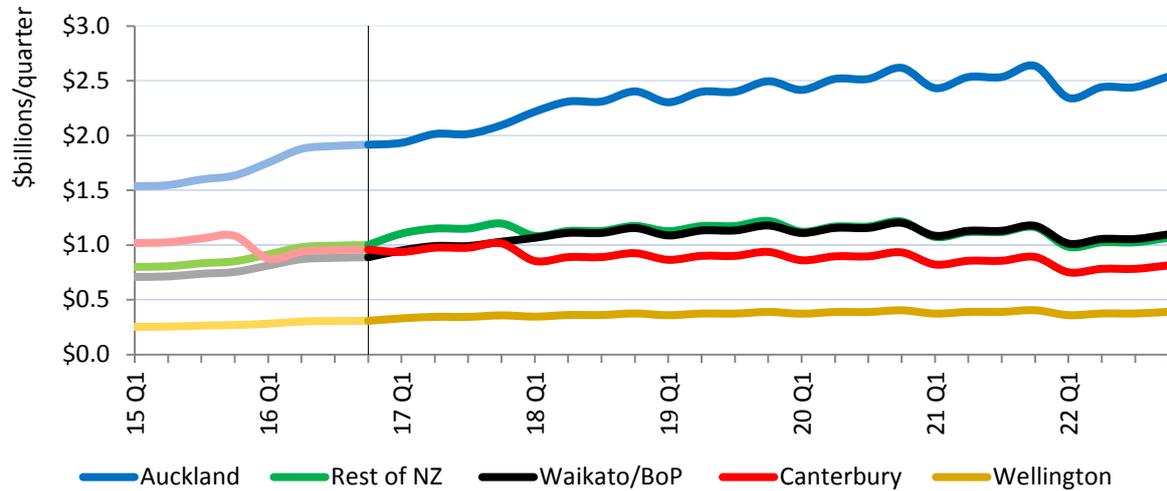
Source: BRANZ

Residential building regional comparison

The Waikato / Bay of Plenty experienced the strongest growth in residential building activity in 2016 at 19%, closely followed by Auckland and the Rest of New Zealand at 18% growth. Wellington grew 15%, while Canterbury activity reduced by 11%.

Auckland and the Waikato / Bay of Plenty regions are expected to see a continued period of strong growth in residential building activity, with 36% and 31% growth respectively, before levelling out in 2021. Wellington is expected to have 30% growth to 2021, and the Rest of New Zealand to have 21% before levelling out in 2019. Canterbury residential activity is expected to continue decreasing to 2022.

Figure 3-15 Value of residential building by region

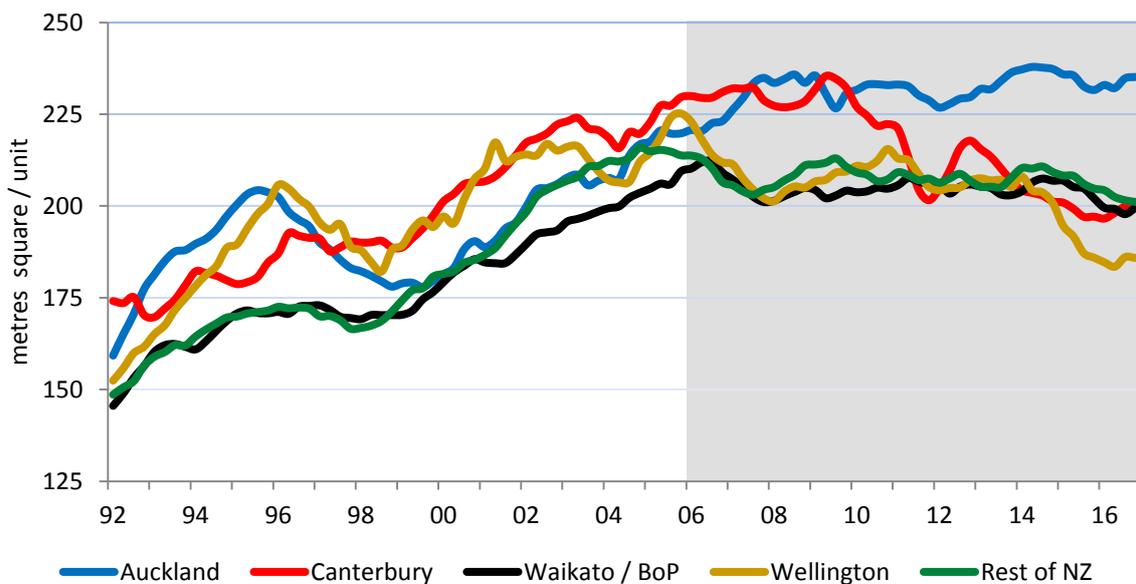


Source: BRANZ

Detached dwelling floor area - regional comparisons

In most regions, the average floor area of houses (detached dwellings) has stayed the same since 2006. However, in Canterbury and Wellington, average floor areas have decreased in the last decade, Canterbury from 230m² to 200m² and Wellington from 220m² to 185m².

Figure 3-16 Average detached dwelling unit size, regionally (1992-2016)



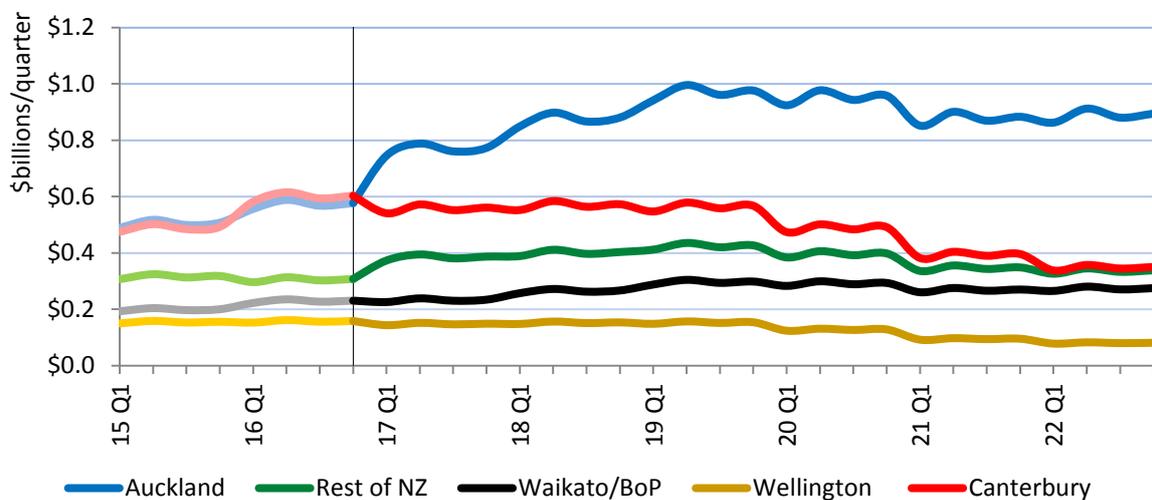
Source: Statistics NZ

Non-residential building regional comparison

Auckland and Canterbury had similar values of non-residential building activity in 2016, with Auckland experiencing 14% growth to \$2.3b, and Canterbury growing 23% to \$2.4b. The Waikato / Bay of Plenty also had 15% growth to \$0.9b, while activity levels were reasonably flat for Wellington and the Rest of New Zealand in 2016.

These forecasts include a peak in non-residential building in Canterbury in 2016, then remaining high (above \$2.2b a year to 2019), before declining further. High growth is expected for Auckland (69%) and the Waikato / Bay of Plenty regions (29%), before an expected high of \$3.9b and \$1.2b in 2019, respectively. The Rest of New Zealand is collectively expected to have 39% growth to a high of \$1.5b in 2017. Wellington is expected to stay around current levels of \$0.6b to 2019, before reducing to \$0.3b in 2022.

Figure 3-17 Value of non-residential building by region

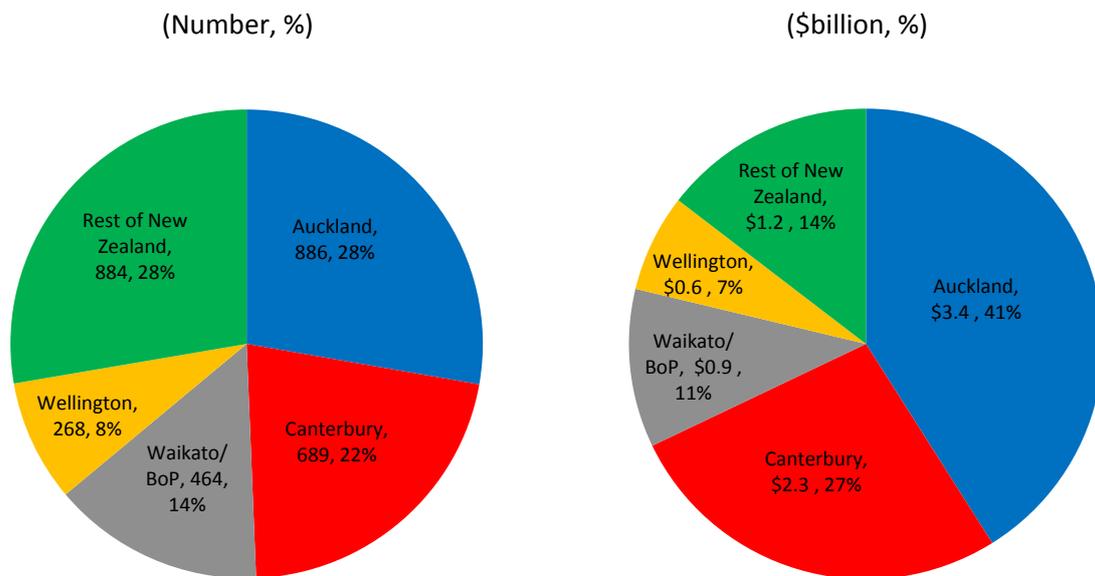


Source: BRANZ

Non-residential building known project regional comparison

Auckland and Canterbury known project data includes a larger share of the very high value non-residential building projects (see [Appendix D](#) for more details). The Rest of New Zealand is expected to have more of the lower value non-residential building projects.

Figure 3-18 Number and value of known non-residential projects anticipated to start in the year to December 2017, by region

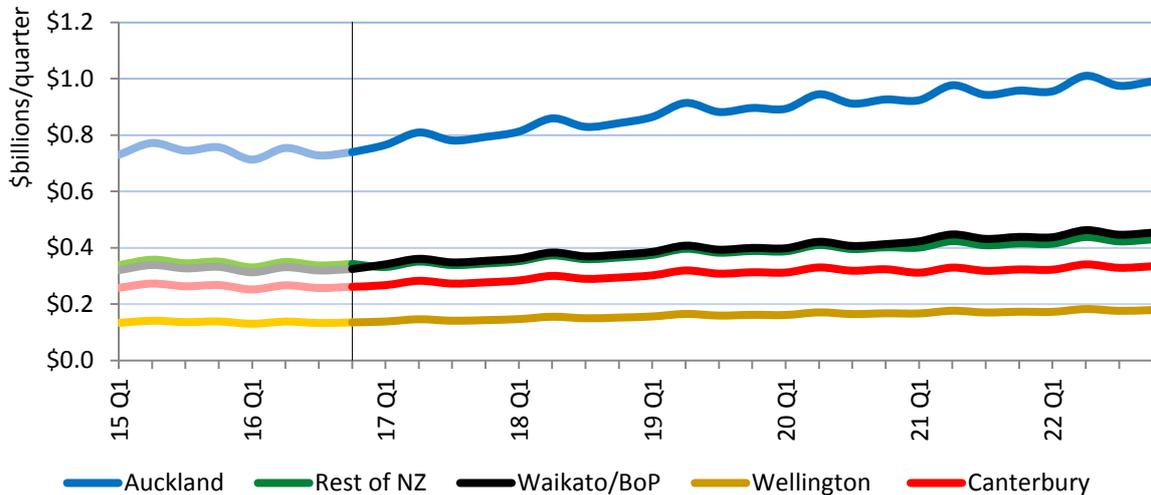


Source: Pacifecon

Infrastructure activity regional comparison

All regions are forecast to experience infrastructure growth to 2022. From 2016 to 2022 the following growth is expected: Waikato / Bay of Plenty 40%, Auckland 34%, Wellington 32%, Canterbury 28% and the Rest of New Zealand 25%.

Figure 3-19 Value of Infrastructure activity by region

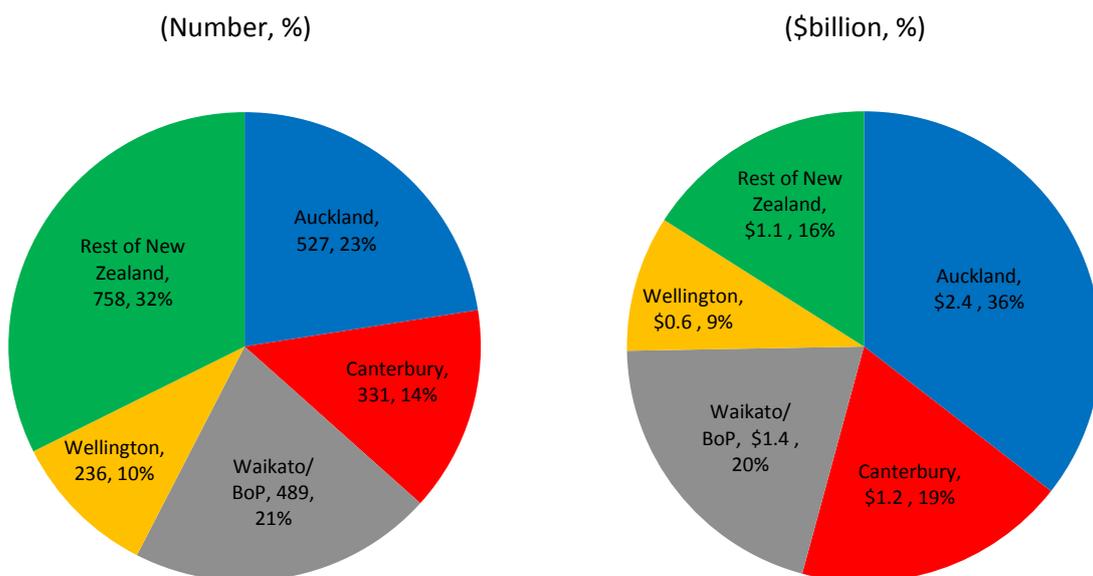


Source: BRANZ

Infrastructure known project regional comparison

Auckland and Canterbury known project data includes a larger share of the very high value infrastructure projects (see [Appendix D](#) for more details) The Rest of New Zealand is expected to have more of the lower value infrastructure projects.

Figure 3-20 Number and value of all known infrastructure projects anticipated to start in the year to December 2017, by region



Source: Pacifecon

4 Regional forecast

This section discusses the four main regions in greater detail, with aggregated data provided for the rest of New Zealand:

[Auckland](#)

[Canterbury](#)

[Waikato / Bay of Plenty](#)

[Wellington](#), and

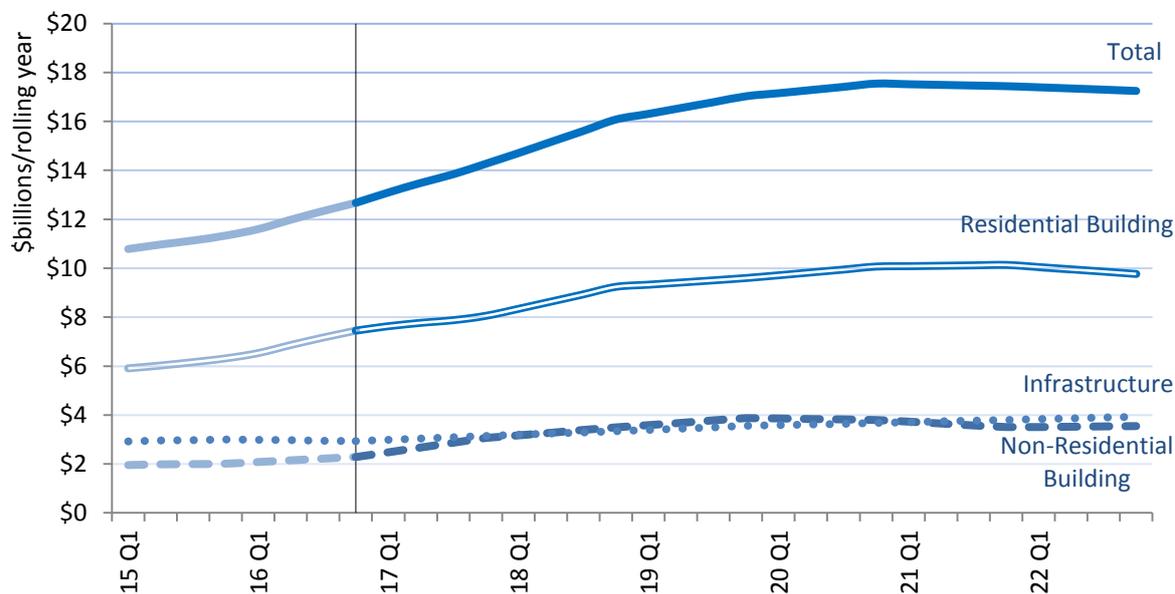
[Rest of New Zealand](#) (some detail about individual regions is given).

4.1 Auckland¹²

Auckland accounted for 37% of all building and construction activity in NZ in 2016, and for 41% of the forecast value from 2017 to the end of 2022. Auckland had 12% growth in building and construction in 2016; we expect continued demand to result in 38% more growth which will be sustained after levelling out in 2020.

Residential building in Auckland in 2016 experienced 18% growth, non-residential building 14%, and infrastructure activity levels reduced slightly. All activities, but particularly residential buildings, are driving the long-term growth with another 35% growth expected before levelling out in 2021. Non-residential building is forecast to have a strong period of growth to 2019 growing by 69%, before levelling out, while infrastructure activity is expected to grow by 30% over the next five years.

Figure 4-1 All construction in Auckland, by value



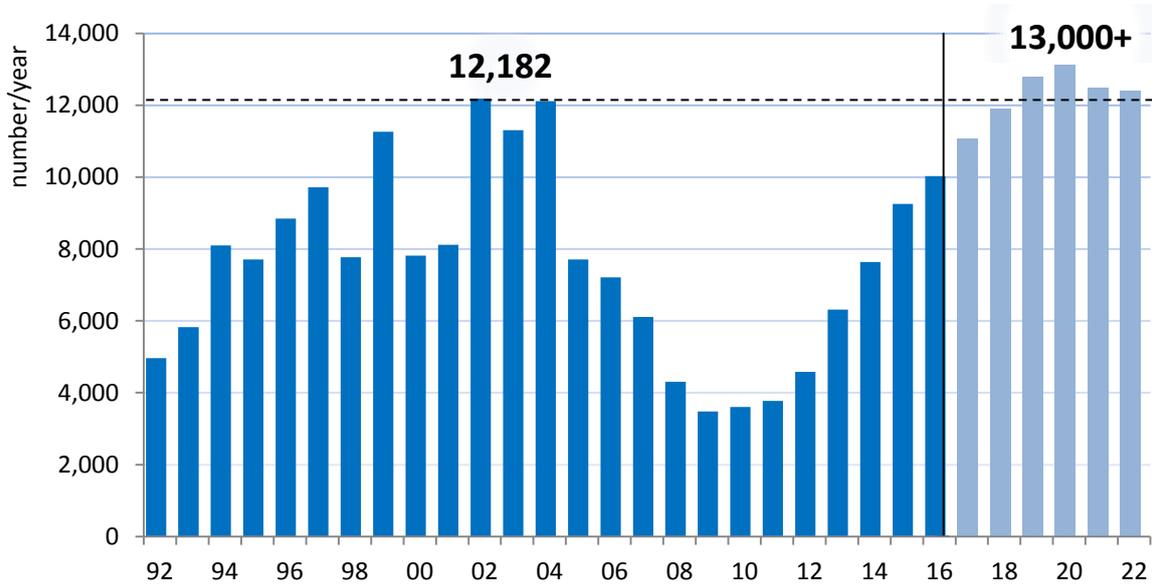
Source: BRANZ / Pacifecon

¹² The area covered by Auckland Council.

Auckland dwelling consents

The number of dwellings consented in Auckland exceeded 10,000 in 2016, representing 8% growth. In 2019 it is forecast that the number of dwelling units in Auckland will exceed the 2002 peak of 12,182, and continue to grow to above 13,000 dwellings per year in 2020.

Figure 4-2 Dwelling units consented in Auckland



Source: Statistics NZ / BRANZ

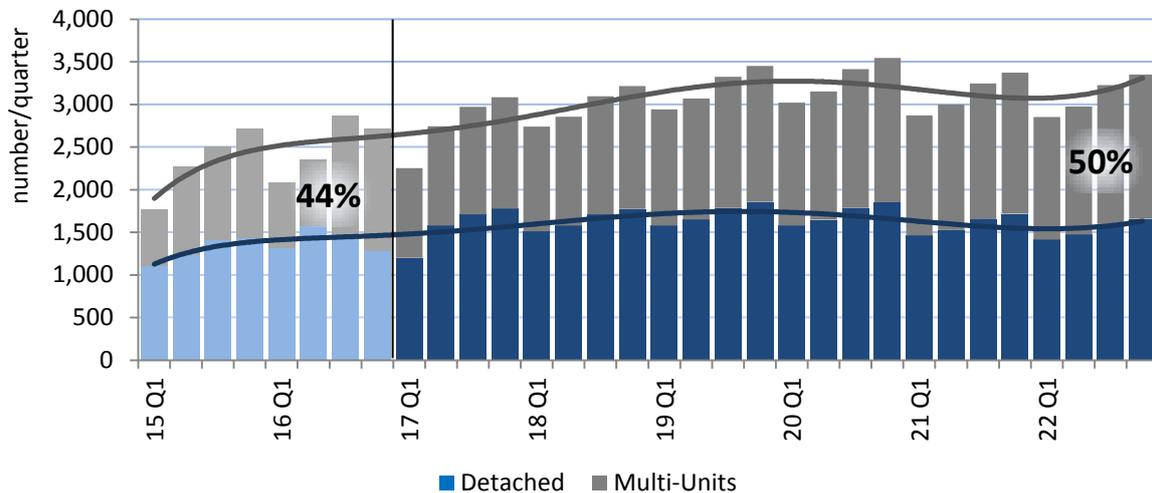
The report forecasts 93,000¹³ new dwelling consents in Auckland between January 2015 and December 2022.

¹³ See [Appendix F](#) for numbers from previous forecasts.

Auckland multi-unit consents

Auckland was the region with the highest share of multi-unit dwellings consented for 2016 (44%); this is forecast to increase to 50% by 2022. Almost 50,000 detached dwelling consents, and over 43,000 multi-unit dwellings, are projected for Auckland from 2015 through 2022.

Figure 4-3 Dwelling units consented in Auckland¹⁴



Source: BRANZ

Planned residential and non-residential building work for Auckland includes:

- new residential builds: *Special Housing Areas* and all other types of privately initiated building, including central city apartments and inner suburb medium density dwellings
- retirement villages (new and expanded) and student accommodation, and
- commercial: mixed use developments (with mixtures of residential, retail, office and parking), retail outlets, flexible-plan commercial buildings, airport terminal expansion, hotels, prisons, car-parking, civic buildings, tourist and sporting facilities, theatres, zoo redevelopment, university buildings and school expansions.

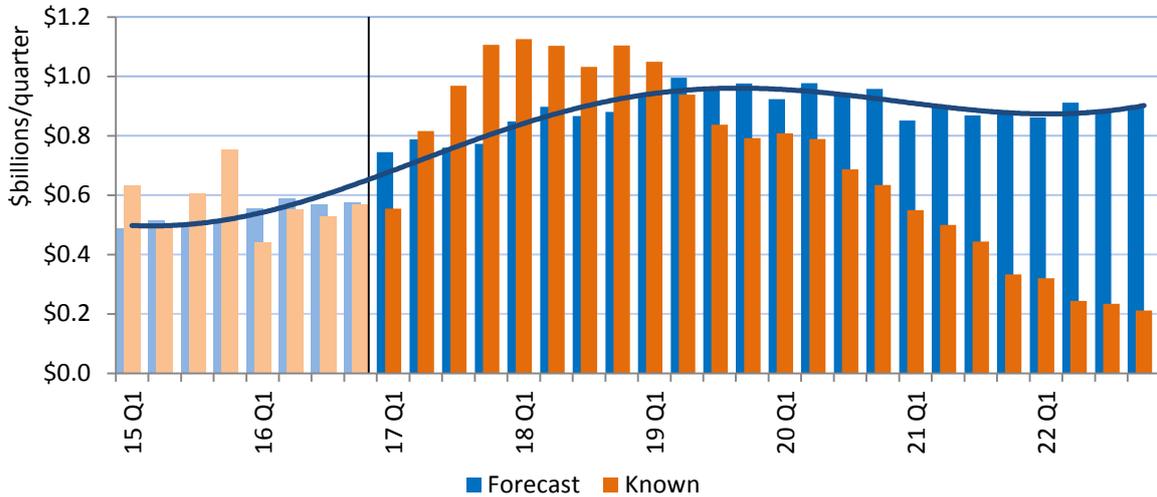
Source: Pacifecon

¹⁴ A table of annual total dwelling units actual and forecast is provided in [Appendix F](#).

Non-residential building activity in Auckland

Non-residential building activity grew 14% over 2016 and is forecast to rapidly increase by 69% to \$3.9b in 2019. This forecast growth rate is supported by a higher than typical peak in the value of known project intentions in the Pacifecon dataset for Auckland around 2018.

Figure 4-4 Non-residential building activity for Auckland

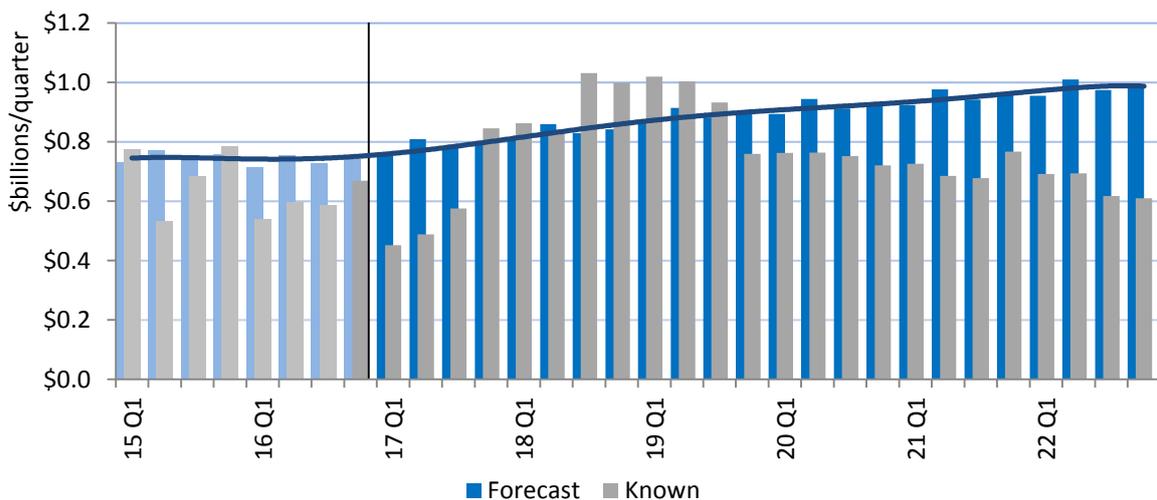


Source: BRANZ / Pacifecon

Infrastructure activity in Auckland

Auckland infrastructure activity decreased slightly to \$2.9b in 2016. There is, however, a high level of value of known project intentions in the Pacifecon dataset for Auckland for the next six years: infrastructure growth is forecast to turn around in 2017 with 34% growth forecast over the next six years to \$3.9b in 2022.

Figure 4-5 Infrastructure activity for Auckland



Source: Pacifecon / BRANZ

Planned infrastructure work for Auckland includes:

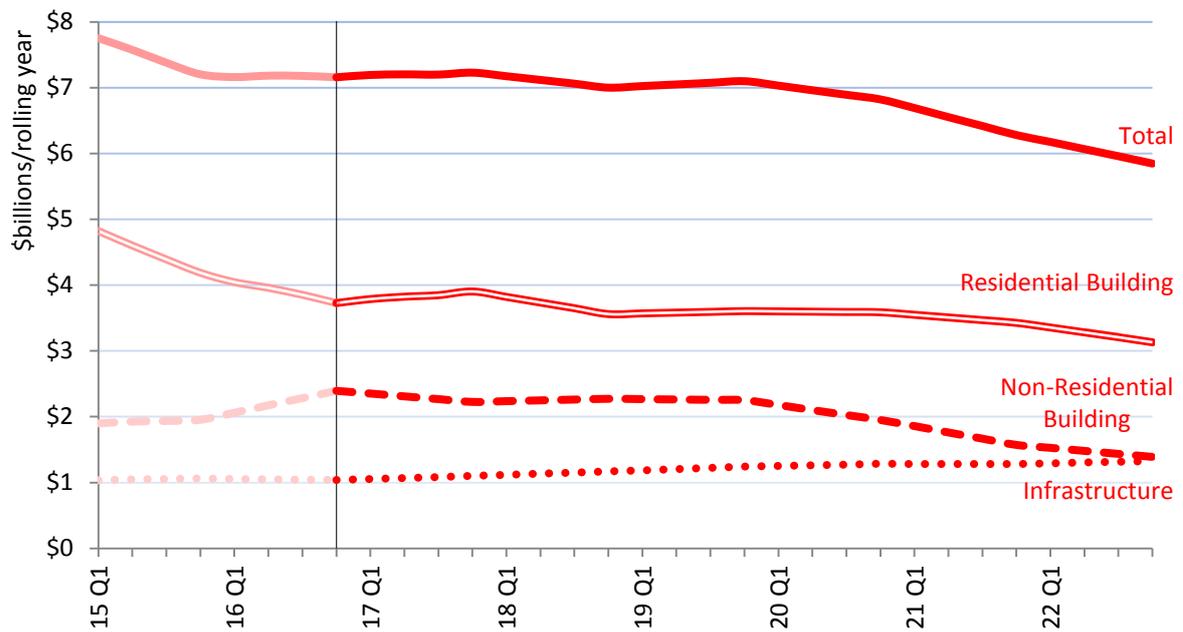
- civil work, e.g. roads, rail and interchanges for bus/train (the City Rail Link is underway)
- residential subdivisions, water, wastewater, storm water, and
- new town centres and improvements to older suburbs.

Source: Pacifecon

4.2 Canterbury¹⁵

Following a slight drop from the 2014 peak in rebuild activity in 2015, total value of activity in building and construction held for Canterbury in 2016. Although residential activity experienced an 11% decrease in 2016, growth in non-residential building activity balanced out the total level of activity. Residential building activity, although decreasing, has remained at a higher level than previously forecast. It is now expected to continue at current levels to 2018 before gradually declining for the rest of the forecast period. Non-residential building is currently at a high peak, and is expected to maintain this level until 2020, before decreasing. Infrastructure activity is expected to grow steadily throughout the next six years, by 28% from 2016 levels to \$1.3b in 2022.

Figure 4-6 All construction in Canterbury, by value



Source: BRANZ / Pacifecon

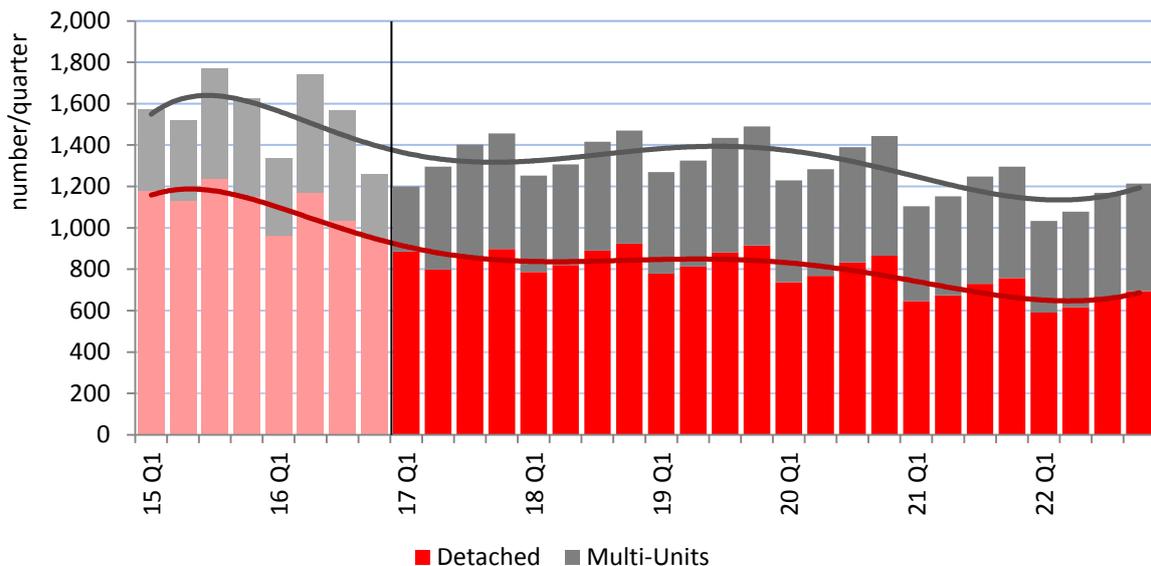
¹⁵ Canterbury includes: Ashburton, Christchurch City, and Hurunui, Mackenzie, Selwyn, Timaru, Waimakariri, Waimate and Kaikoura Districts.

Canterbury dwelling consent activity

The number of dwellings consented in Canterbury fell by 9% in 2016, which was less than previously forecast. In 2016 a total of 5,900 dwelling units were consented in Canterbury; we are now expecting this slower rate of decline to continue, with our forecasts now showing dwelling consent numbers remaining above 5,000 units annually until 2021.

12,400 dwelling units were consented during 2015 and 2016, and another 31,000 dwelling units (19,000 detached, and 12,000 multi-units) are forecast for Canterbury to the end of 2022.

Figure 4-7 Dwelling units consented in Canterbury



Source: BRANZ

Planned residential and non-residential building work for Canterbury includes:

- new, replacement or earthquake strengthening of commercial buildings; eg retail outlets car-parking, business premises, civic buildings, tourist, recreation and sporting facilities, schools, universities (including student accommodation), hotels, churches and hospitals
- retirement villages
- milk processing plants, and
- house repairs, rebuilds and new builds (including on TC3¹⁶ land and hill sites).

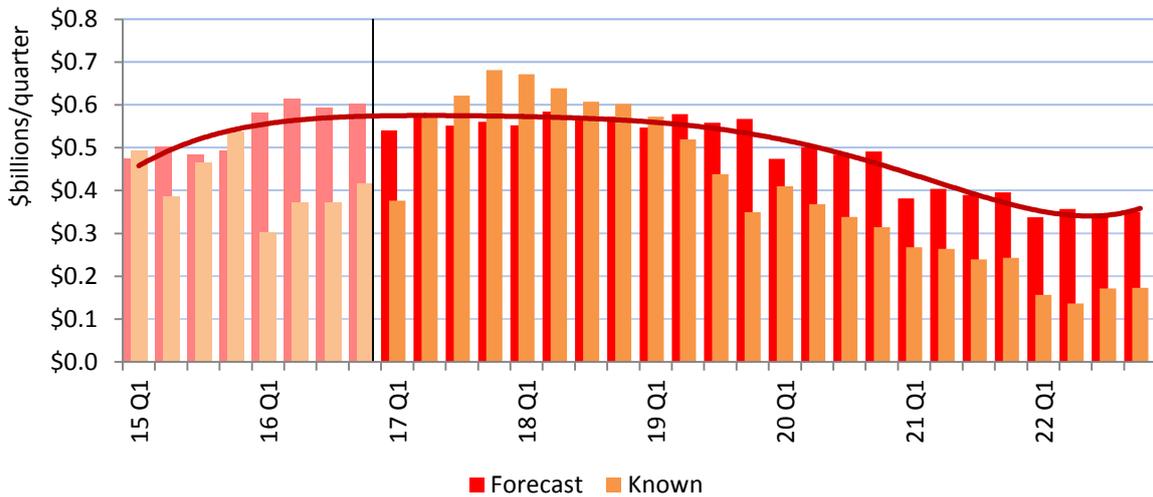
Source: Pacifecon

¹⁶ TC3 refers to technical category three. Land that has been classified as TC3 in the Green Zone has a higher probability of being at some risk of moderate to significant land damage from liquefaction in future large earthquakes. It does not apply to the Residential Red Zone where significantly poorer ground conditions exist and more severe land damage is expected in future earthquakes.

Canterbury non-residential building

Following the initial focus of the rebuild on infrastructure and homes – the redevelopment of non-residential buildings continues at peak levels with 23% growth to \$2.4b in 2016. It is expected that it will remain above \$2.2b per year before levels begin to taper off after 2020.

Figure 4-8 Non-residential building activity for Canterbury

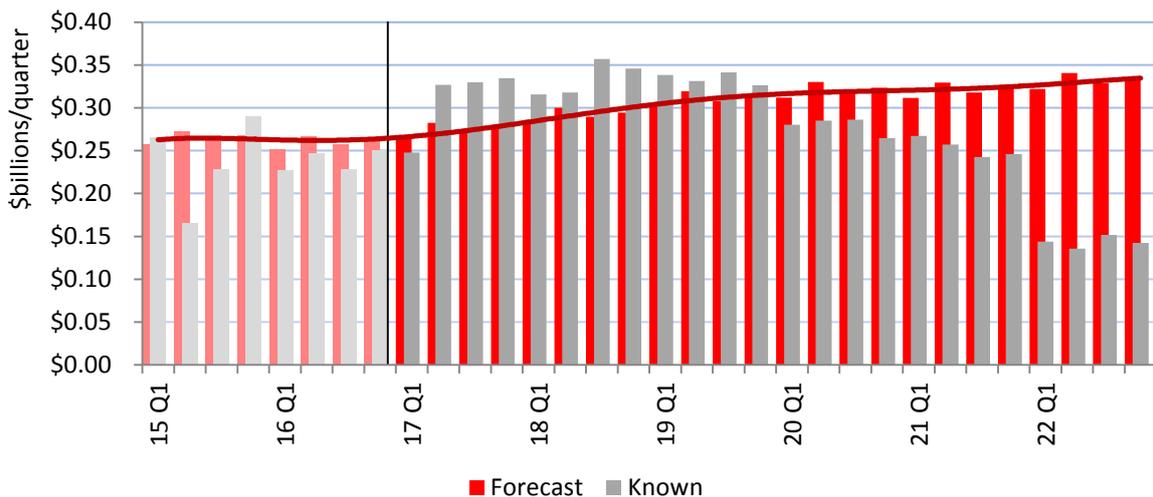


Source: BRANZ / Pacifecon

Canterbury infrastructure activity

Infrastructure activity in Canterbury reduced 2.3% in 2016, but is forecast to experience year on year growth totaling 28% from 2016 levels to 2022. Known Kaikoura earthquake related civil repair works contribute to the forecast growth levels.

Figure 4-9 Infrastructure activity for Canterbury



Source: BRANZ / Pacifecon

Planned infrastructure work for Canterbury includes:

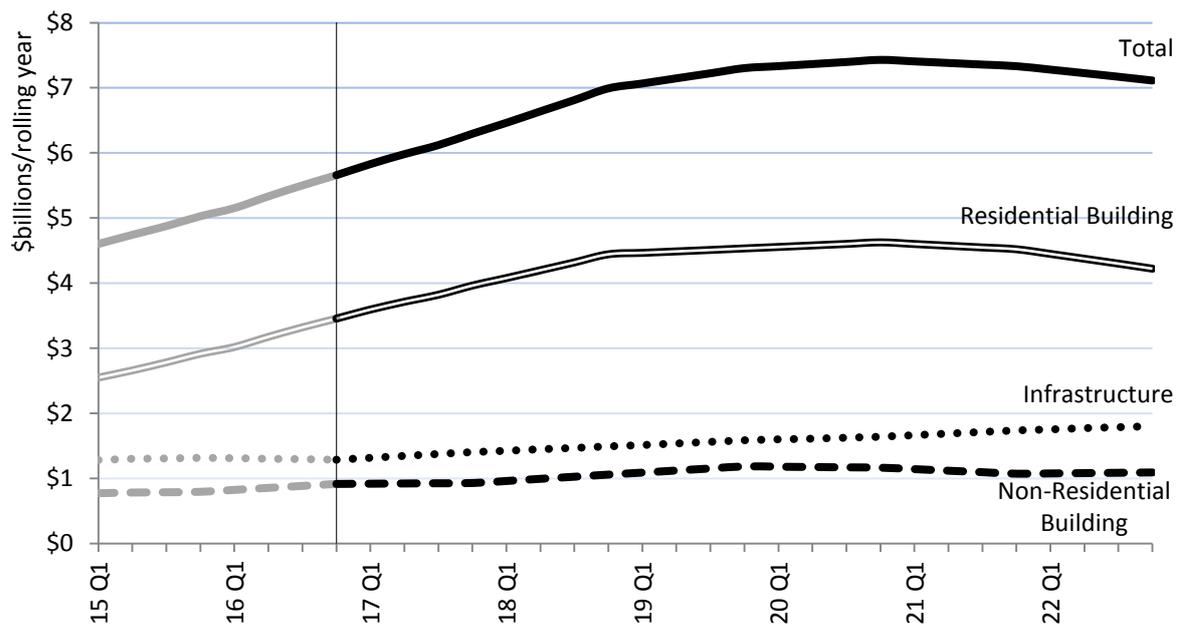
- civil repair works following the November 2016 Kaikoura earthquake.
- civil projects, motorways, suburban roads, port, landscaping and streetscaping, and
- irrigation works.

Source: Pacifecon

4.3 Waikato / Bay of Plenty¹⁷

2016 was another year of strong growth for the Waikato and Bay of Plenty regions, driven by 19% growth in residential building, following on from 21% growth in residential building in 2015. Non-residential building activity grew by 15% in 2016, while infrastructure activity remained level at \$1.3b. These trends are expected to continue with residential building forecast to grow 34% more before levelling out in 2021. Non-residential building is expected to grow by 29% before leveling out in 2020, whereas infrastructure activity is expected to grow steadily year on year totaling 40% growth from 2016 to 2022.

Figure 4-10 All construction in Waikato / Bay of Plenty, by value



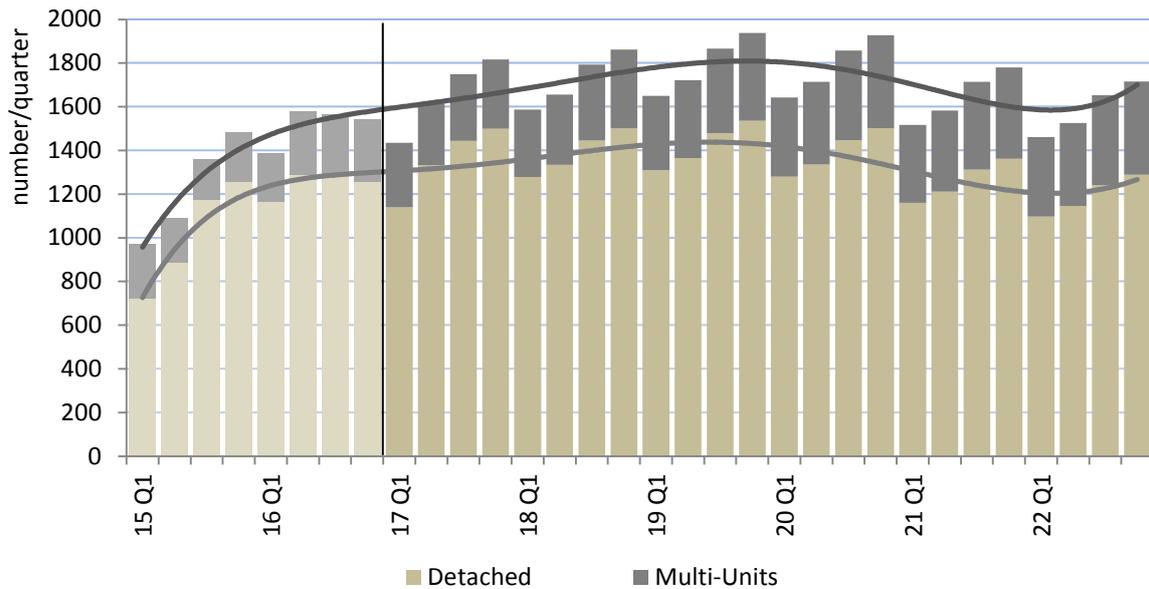
Source: BRANZ / Pacifecon

¹⁷ Waikato / Bay of Plenty includes Tauranga, Hamilton City, Taupo / Turangi, Taupo / Mangakino, Western Bay of Plenty, Rotorua, Kawerau, Whakatane, Opotiki, Waikato, Waipa, Otorohanga, Waitomo, Thames-Coromandel, Hauraki, Matamata-Piako and South Waikato Districts.

Waikato / Bay of Plenty dwelling consent activity¹⁸

The Waikato / Bay of Plenty is currently experiencing high levels of growth with 24% increase in the number of dwelling units consented in 2016, following a 30% increase in 2015. This year on year growth is expected to continue by another 18% before levelling out in 2020. The forecast includes 52,000 new dwelling consents in Waikato / Bay of Plenty between January 2015 and December 2022. Multi-unit type dwellings are forecast to slowly increase their share of the total units consented throughout the forecast period.

Figure 4-11 Dwelling units consented in Waikato / Bay of Plenty



Source: BRANZ

Planned residential and non-residential building work for Waikato / Bay of Plenty includes:

- Detached dwellings and townhouses
- industrial buildings, eg timber mills, milk processing plants
- commercial developments, eg business/retail parks, and
- retirement villages.

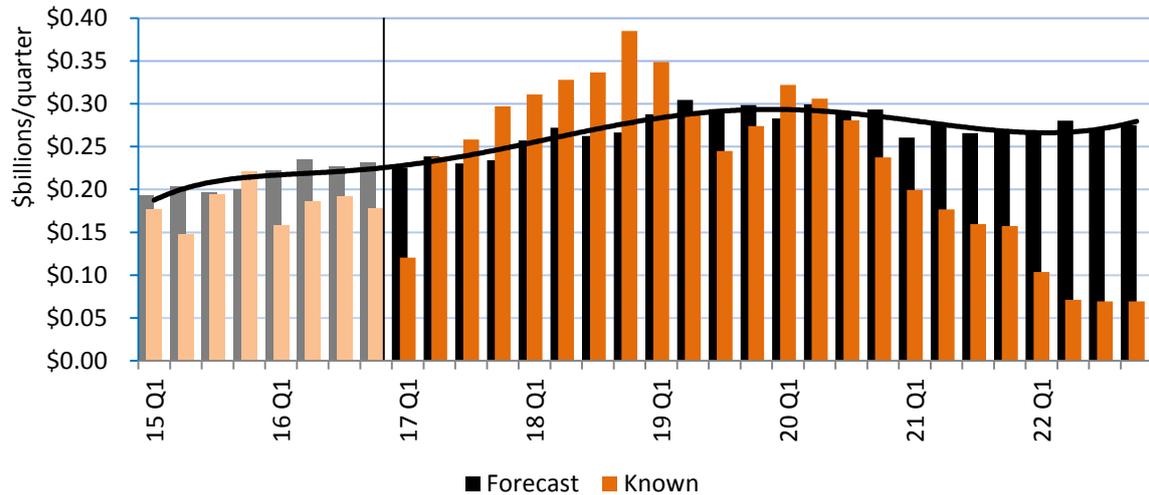
Source: Pacifecon

¹⁸ see the [National Construction Pipeline Report 2016](#) for a comparison of dwelling consent activity for Waikato and the Bay of Plenty.

Waikato / Bay of Plenty non-residential building activity

Non-residential building in the Waikato / Bay of Plenty region experienced 15% growth in 2016. It is expected that non-residential building activity will continue to grow by another 29% before levelling out in 2020. A higher than typical peak in the value of known project intentions in the Pacifecon database for 2018 Q4, indicating a number of buildings are expected to commence around this time.

Figure 4-12 Non-residential building activity for Waikato / Bay of Plenty

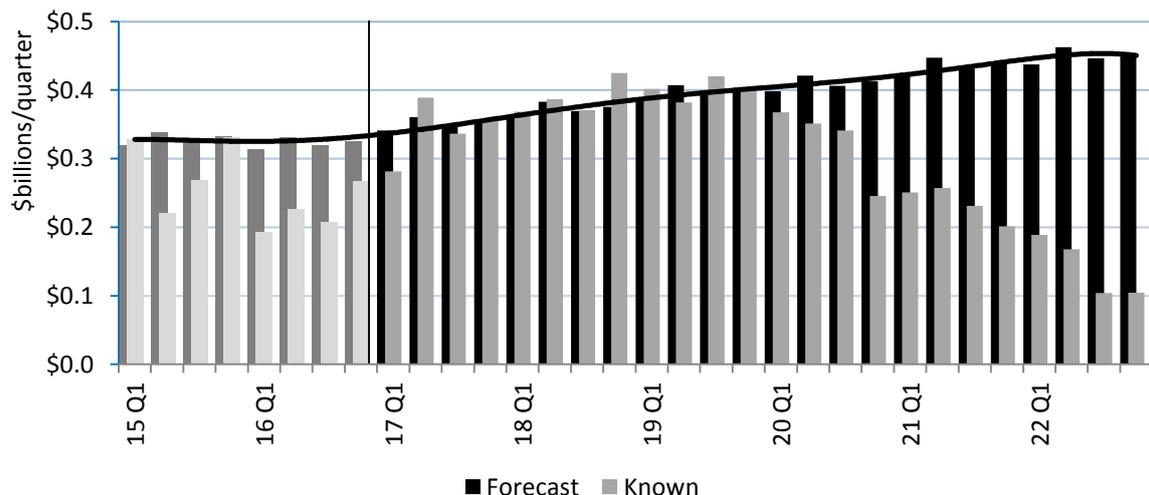


Source: BRANZ / Pacifecon

Waikato / Bay of Plenty infrastructure activity

Infrastructure activity in the Waikato / Bay of Plenty region decreased slightly to \$1.3b in 2016. A high level of known project intentions for Waikato / Bay of Plenty support the forecasted infrastructure growth with 40% growth forecast over the next six years to \$1.8b in 2022.

Figure 4-13 Infrastructure activity for Waikato / Bay of Plenty



Source: BRANZ / Pacifecon

Planned infrastructure work for Waikato / Bay of Plenty includes:

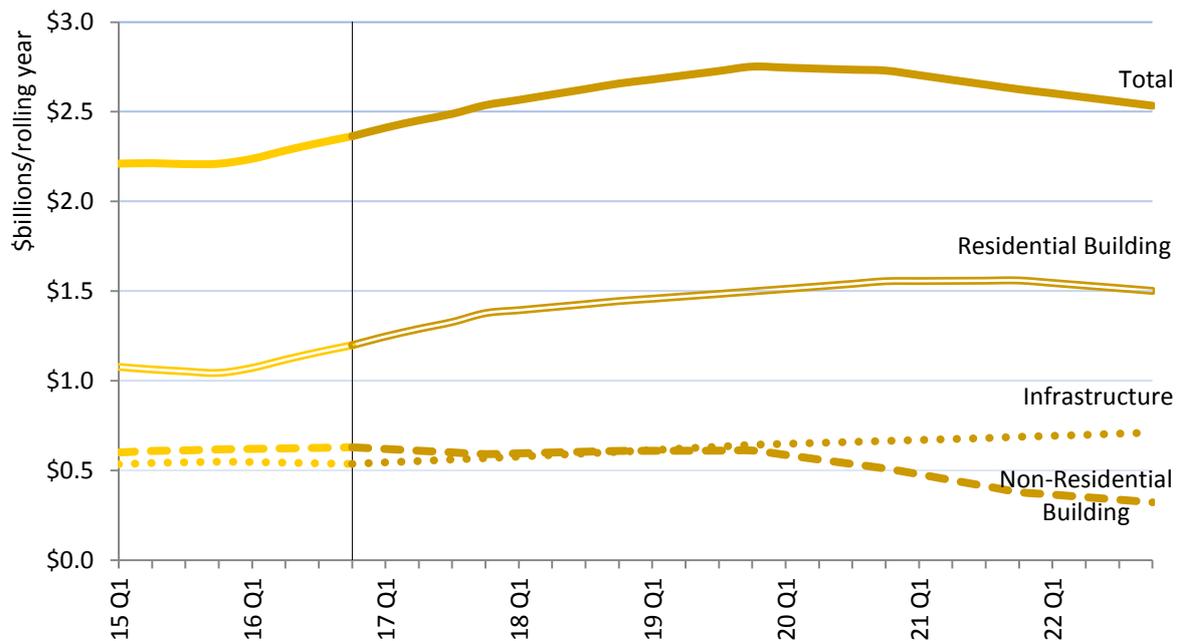
- civil projects, eg roads of national significance, residential/industrial subdivisions, transport/freight hubs, and geothermal plants

Source: Pacifecon

4.4 Wellington¹⁹

Wellington total building and construction value rose by 6.9% in 2016 to \$2.4b, with the majority of growth coming from a 15% increase in residential buildings. Total building and construction value is expected to continue growing by 16% before levelling out in 2020, with growth to 2022 expected for residential building and infrastructure, while non-residential building activity in Wellington is expected to remain around current levels to 2020 before reducing to 2022.

Figure 4-14 All construction in Wellington, by value



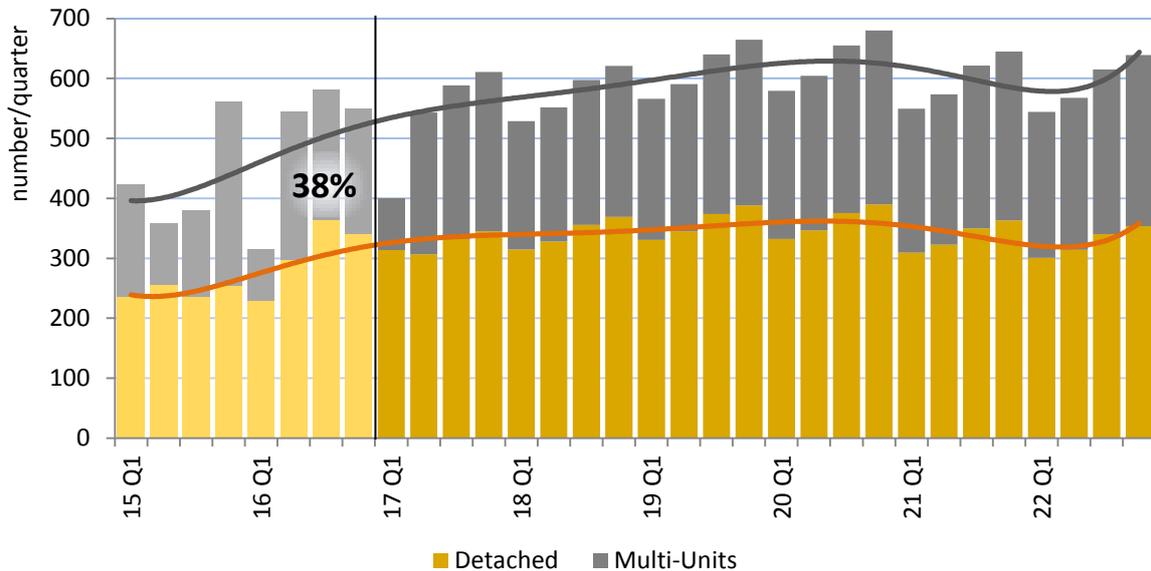
Source: BRANZ / Pacifecon

¹⁹ Wellington includes: Carterton, Kapiti Coast District, Lower Hutt, Masterton, Porirua City, South Wairarapa Districts, Upper Hutt, and Wellington City.

Wellington dwelling consents

The Wellington region continues to have the second highest ratio of multi-unit dwellings consented for 2016 at 38%, ahead of Canterbury's 30%, but behind Auckland's 44%. In 2016 residential dwellings consented increased 16% in Wellington, with 27% more growth expected before levelling out in 2020.

Figure 4-15 Dwelling units consented in Wellington



Source: BRANZ

Planned residential and non-residential building works for Wellington includes:

- retirement villages
- non-residential building work arising from the Kaikoura earthquake²⁰; demolitions, reinstatements, repairs and ongoing earthquake strengthening works
- commercial developments, eg retail, business, cultural and tourist facilities, hotels, convention centres, university expansion, civic buildings and civic centre developments, and
- mixed use developments (with mixtures of residential, retail, office and parking).

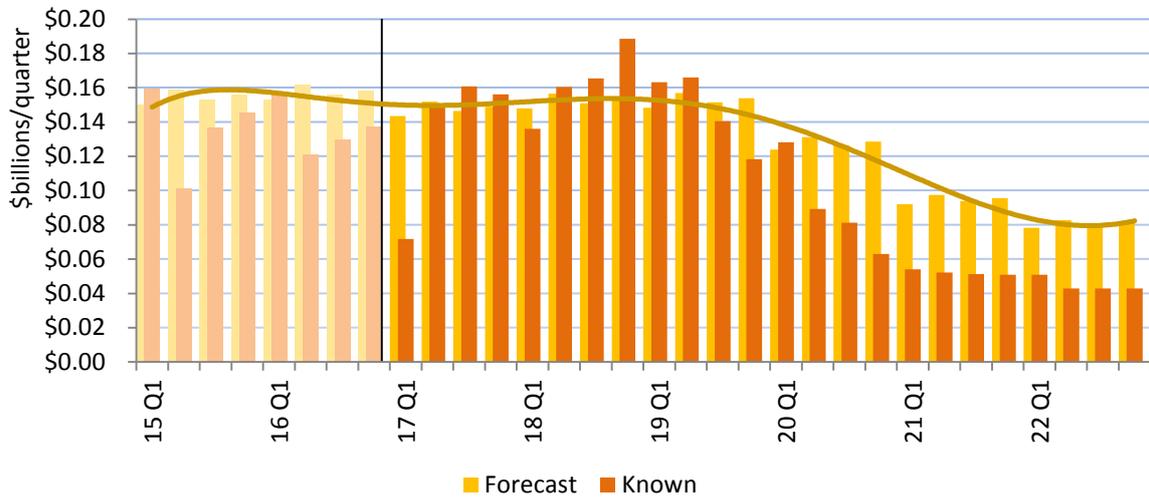
Source: Pacifecon

²⁰ November 2016 Earthquakes centred near Kaikoura causing building and construction damage.

Non-residential building activity in Wellington

Wellington non-residential building activity in 2016 grew 2% to \$0.6b, and is forecast to remain around current levels (dipping slightly by 2.9% to 2019), before reducing below the level of infrastructure activity in the region.

Figure 4-16 Non-residential building activity for Wellington

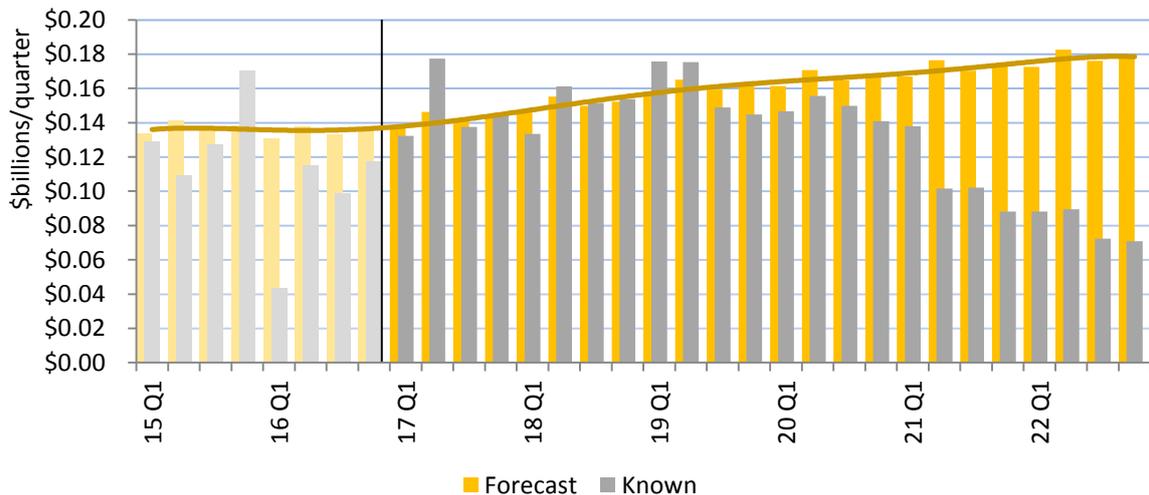


Source: BRANZ / Pacifecon

Infrastructure activity in Wellington

Infrastructure activity in Wellington has stayed around \$0.5b in 2015 and 2016. Infrastructure activity is expected to steadily grow with 32% growth forecast to \$0.7b in 2022.

Figure 4-17 Infrastructure activity for Wellington



Source: BRANZ / Pacifecon

Planned infrastructure work for Wellington includes:

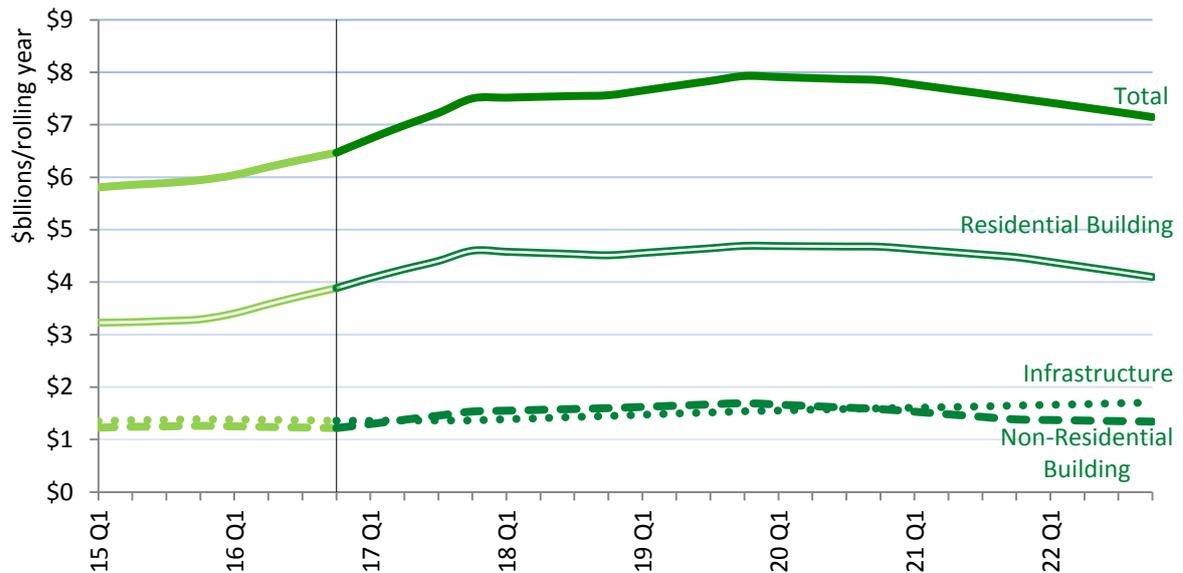
- transport, especially roads and airport (Transmission Gully, Peka Peka to Otaki), and
- other civil projects, eg energy, reservoir, Kaikoura earthquake repairs.

Source: Pacifecon

4.5 Rest of New Zealand

The Rest of New Zealand includes Gisborne, Hawke’s Bay, Manawatu-Wanganui, Marlborough, Nelson, Northland, Otago, Southland, Taranaki, Tasman and the West Coast. It includes the least populated regions of the country, some of which have static or decreasing populations. For these regions combined, the annual value of all building and construction grew 8.8% in 2016 due to 18% growth in residential building activity. The total value of activity is forecast to rise 23% to a gentle peak in 2019 of \$7.9b. Most of the expected growth is from residential building activity.

Figure 4-18 All construction in the Rest of New Zealand, by value

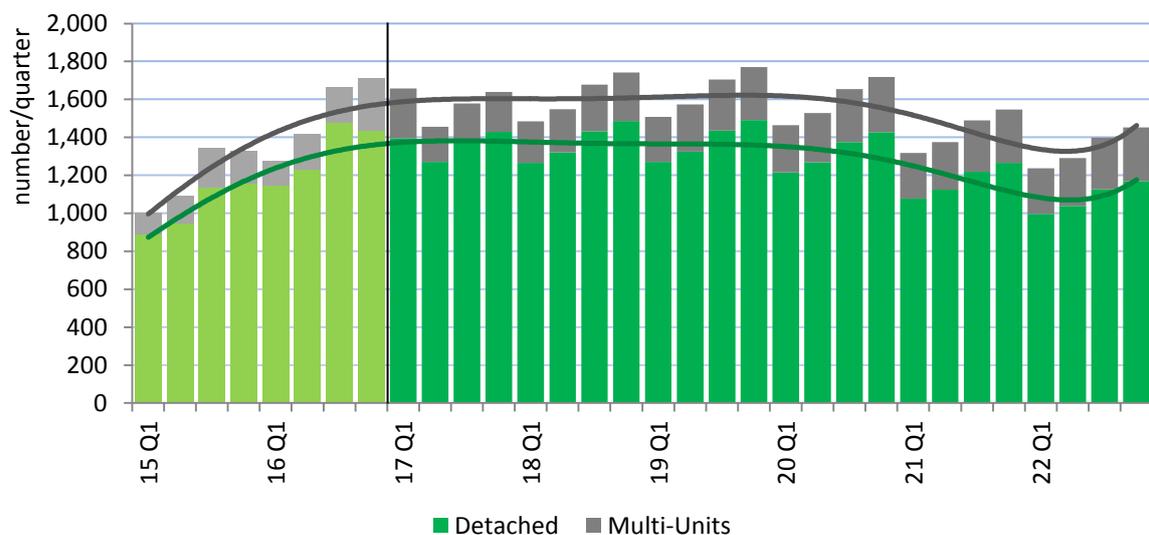


Source: BRANZ / Pacifecon

Rest of New Zealand dwelling consents

The Rest of New Zealand dwelling consents grew by 27% in 2016. Dwelling units consented are forecast to continue around current levels of over 6,000 per year up to 2019 before reducing.

Figure 4-19 Dwellings consented in the Rest of New Zealand

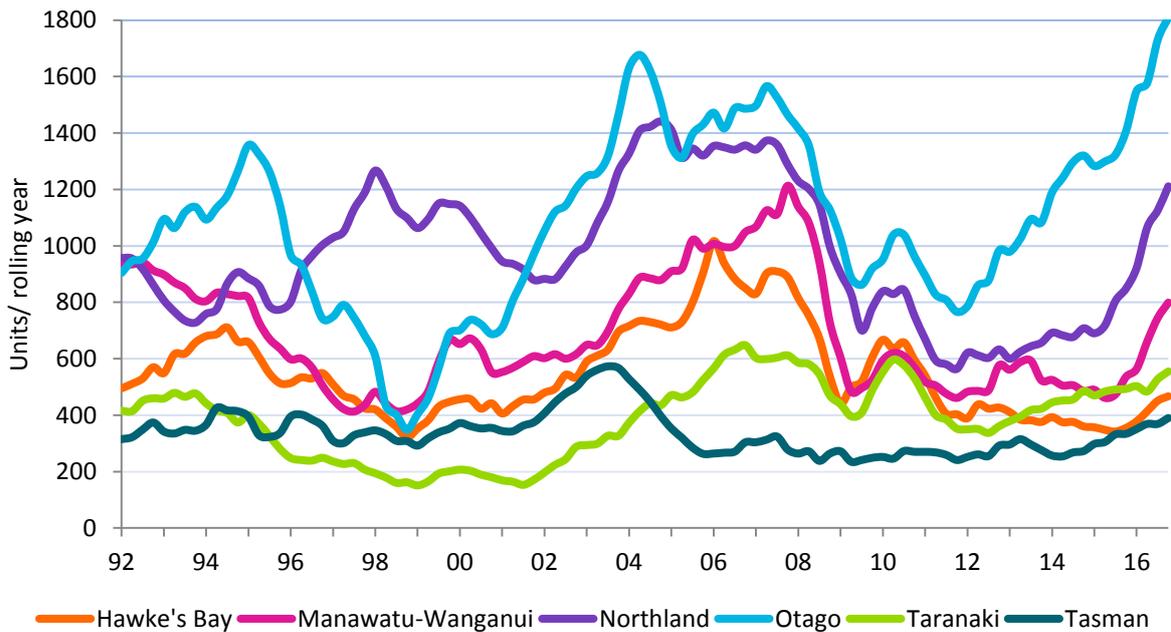


Source: BRANZ

Many of the regions within the Rest of New Zealand combined regions have experienced significant growth in dwelling consents in 2016:

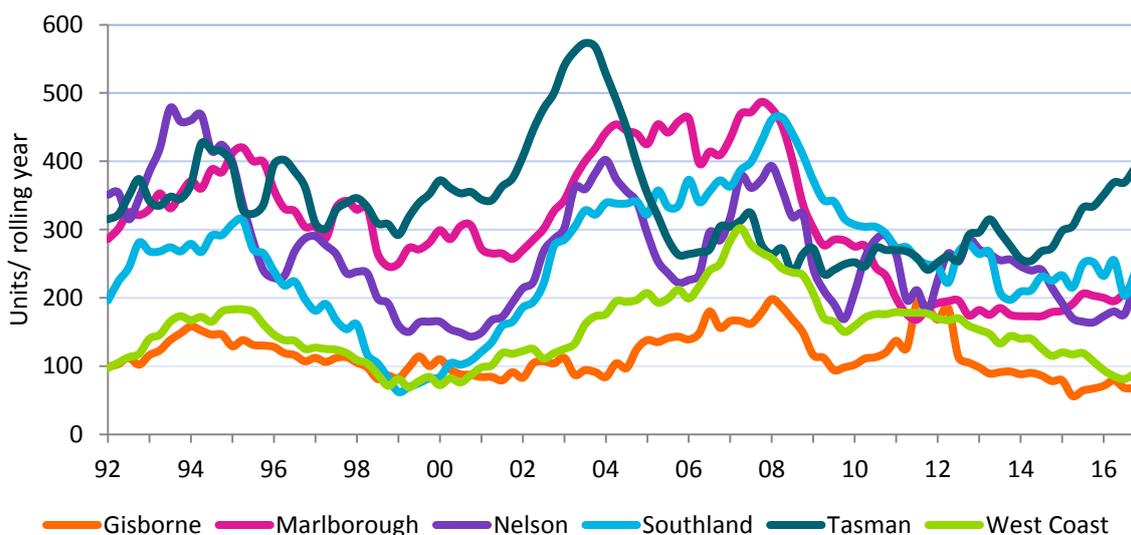
- Manawatu-Wanganui with 49% reaching 800 dwelling units,
- Northland with 43% growth reaching 1,200 dwelling units,
- Nelson with 34% growth reaching over 200 dwelling units,
- Hawke’s Bay with 32% almost reaching 500 dwelling units, and
- Otago with 29% growth to 1,800 dwelling units.

Figure 4-20 Residential dwellings units consented, per year (6 highest sub-regions)²¹



Source: Statistics NZ

Figure 4-21 Residential dwellings units consented, per year (6 lowest sub-regions)



Source: Statistics NZ

²¹ The six 'lower' and 'higher' regions were selected based on their total number of dwellings consented for 2016. Tasman sits in the middle of the eleven regions and is included in both sets for comparison.

Planned residential and non-residential building work for Rest of New Zealand includes:

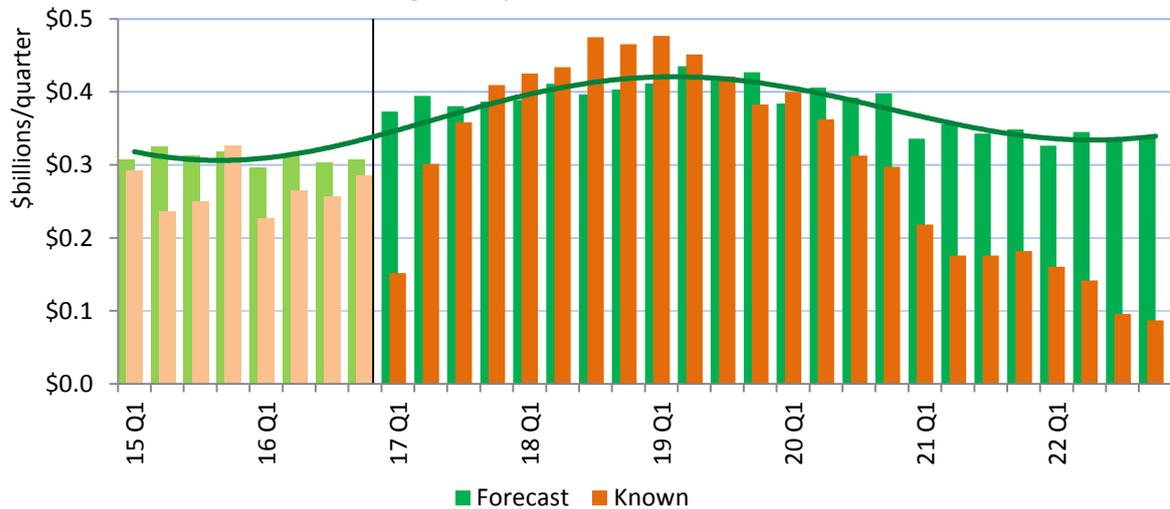
- tourism facilities, hospitality, hotels and motels (particularly Otago)
- commercial and recreational developments, eg offices and other business activities, retail, ICT, wineries, hospitals/health facilities, sport, redevelopment of civic facilities
- heavy industry and industrial projects, eg milk processing plants, saw mills, refineries
- educational facilities, including both universities and schools, and
- retirement villages (new and expanded).

Source: Pacifecon

Rest of New Zealand non-residential construction

Non-residential building activity in the rest of New Zealand remained around \$1.1b in 2015 and 2016. There is a peak in the value of known project intentions in the Pacifecon known project intentions for 2018, indicating a large number of buildings expected to commence around this time. It is forecast that non-residential building activity will grow 39% to \$1.7b in 2019 before dropping back to \$1.3b in 2022.

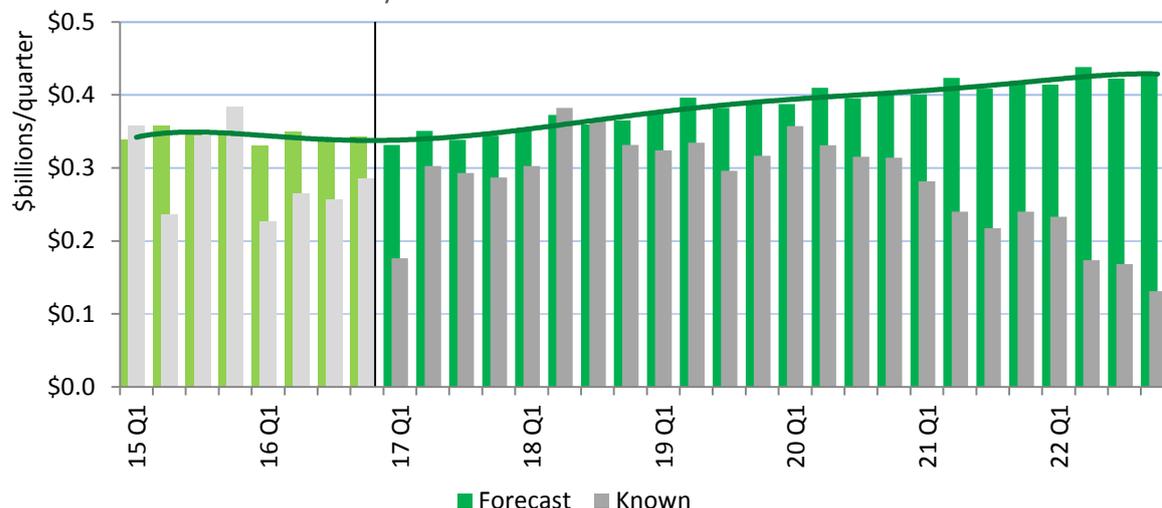
Figure 4-22 Non-residential building activity for the rest of New Zealand



Rest of New Zealand infrastructure activity

Infrastructure activity in the rest of New Zealand region remained around \$1.4b in 2015 and 2016. Infrastructure growth is expected to pick up in 2017 with 25% growth forecast over the next six years increasing to \$1.7b in 2022.

Figure 4-23 Infrastructure activity for the Rest of New Zealand



Source: Pacifecon / BRANZ

Planned infrastructure work for Rest of New Zealand includes:

- energy sector developments, eg hydro and geothermal plants
- civil projects, eg air, roads, rail, ports, water storage, irrigation schemes

Source: Pacifecon

Table 4-1 All building and construction in the year to 31 December 2017 for the Rest of New Zealand, by region

Region	Residential Building (\$m)	Anticipated Non-residential Building Projects (\$m) ²²	Anticipated Other Construction Projects (\$m)
Otago	\$1,542	\$ 511	\$ 229
Nelson/Marlborough	\$346	\$ 145	\$ 151
Manawatu/Wanganui	\$545	\$ 144	\$ 184
Northland	\$840	\$ 111	\$ 189
Hawkes Bay/Gisborne	\$471	\$ 137	\$ 140
West Coast	\$66	\$ 76	\$ 54
Southland	\$170	\$ 41	\$ 56
Taranaki	\$366	\$ 57	\$ 57
NZ wide ²³	-	\$ 343	\$ 8
Total	\$4,346	\$ 1,563	\$ 1,067

Source: Pacifecon / BRANZ

Otago has grown considerably since the 2013 report; it is the largest region in the Rest of New Zealand combined region, and has caught up to Wellington in terms of residential building value in 2016, and getting closer to the level of non-residential building activity also.

²² Values in red are from Pacifecon's dataset of anticipated project values and are subject to optimism bias.

²³ NZ wide is used in the Pacifecon dataset to define work that covers all of New Zealand, eg ultra-fast broadband rollout.

5 Comparison with the 2016 National Construction Pipeline Report

5.1 Adjustments to data from the 2016 report

The following adjustments have been made to the forecasts in the 2015 report to enable a like-for-like comparison with those in this report.

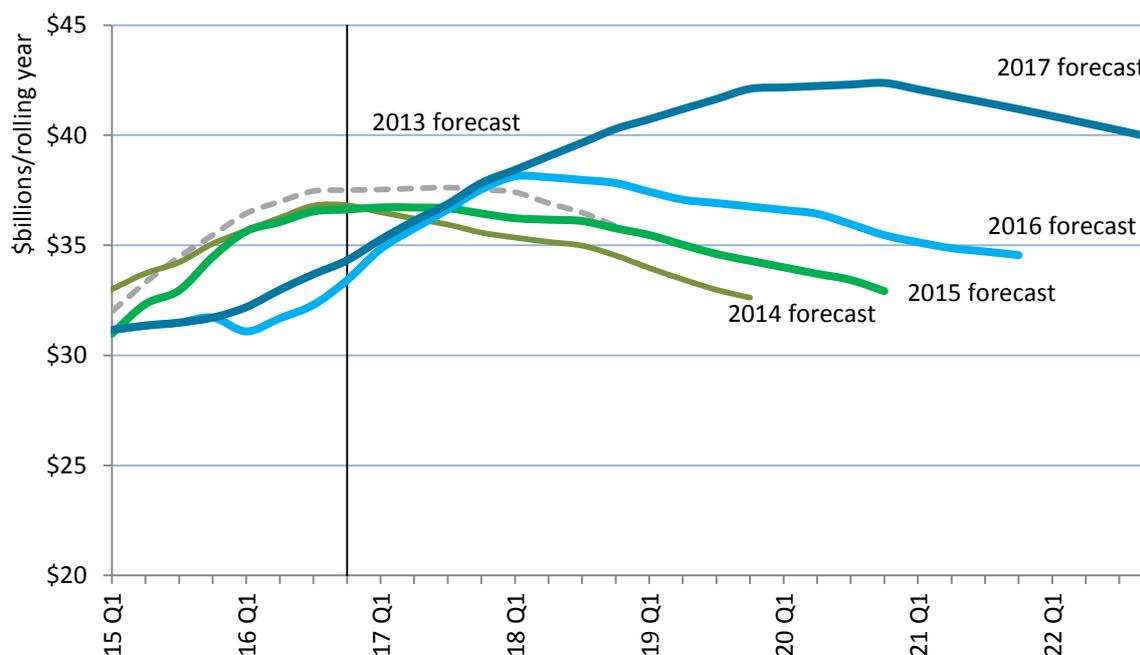
- Conversion from December 2015 \$ to December 2016 \$ to account for inflation as follows:
 - residential building 6.0%
 - non-residential building 5.6%
 - infrastructure 3.1%
- Statistics NZ's have made the following downward revisions to the December 2015 fixed capital formation data²⁴:
 - residential building 2.1%
 - non-residential building 5.5%
 - infrastructure 3.7%

5.2 How well did we do with the 2016 forecast?

All previous reports have been adjusted to 2016 dollars for comparison.

The revised forecast for 2016 to 2022 for all construction now has a higher longer and smoother peak. More growth occurred in residential building than forecast. The non-residential building forecasted growth occurred, but infrastructure activity decreased rather than growing as forecast. The unexpected decrease in infrastructure was balanced out by more than forecasted residential building growth, leaving the total value of activity slightly higher than forecast.

Figure 5-1 All construction nationally, five pipeline report forecasts compared



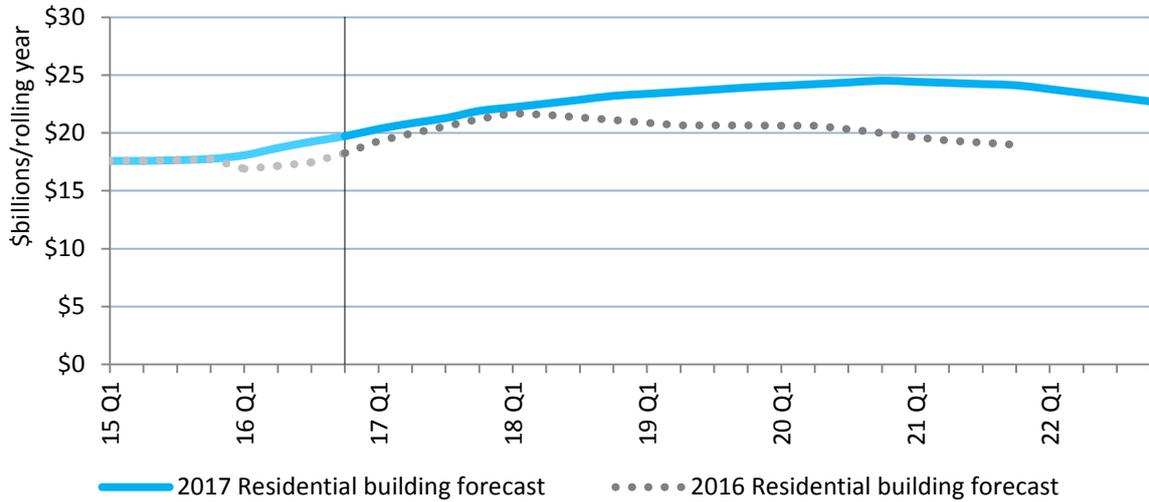
Source: Pacifecon / BRANZ

²⁴ Statistics NZ adjusts the Gross Fixed Capital Formation data following its initial release for a couple of years; it is likely that this data will be adjusted again, up or down, in the next 12 months.

Residential forecast comparison

Residential building is a major driver of the smoother, longer peak and the overall increase in forecast building and construction. This is largely due to the unmet demand for housing in Auckland and expectation that growth in residential building will continue for longer than previously forecast.

Figure 5-2 All residential building nationally 2016 and 2017 forecasts compared

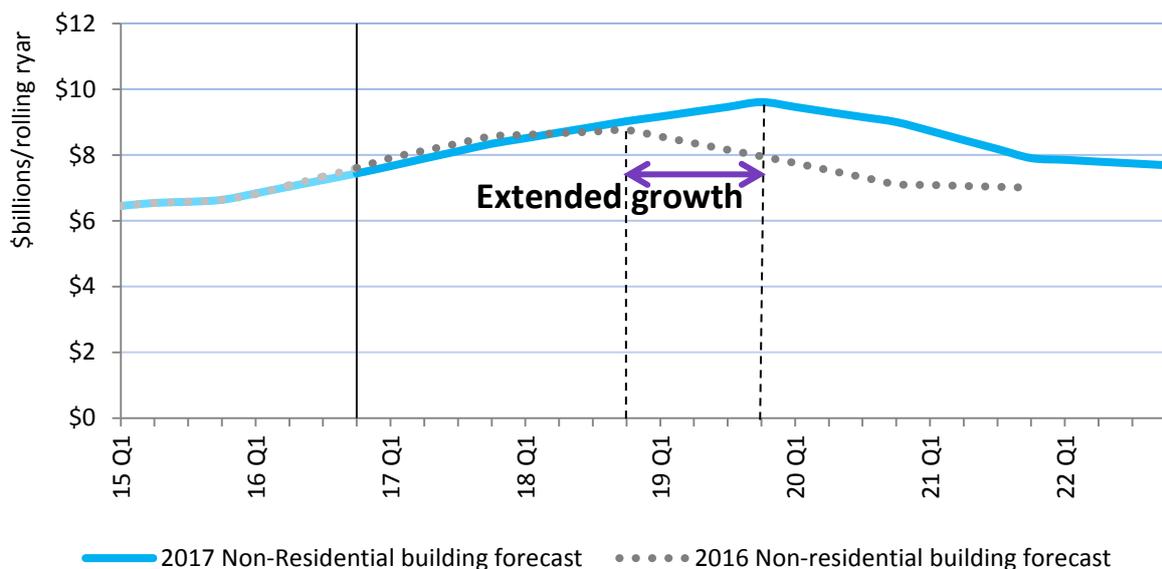


Source: BRANZ

Non-residential building forecast comparison

This report forecasts a slightly lower rate of growth for non-residential building- to a later, higher, longer peak than the 2016 report; \$9.6b in 2019. This is supported by the unusually high levels of non-residential building projects in the 2018 Pacifecon’s known project database.

Figure 5-3 Non-residential building nationally 2016 and 2017 forecasts compared

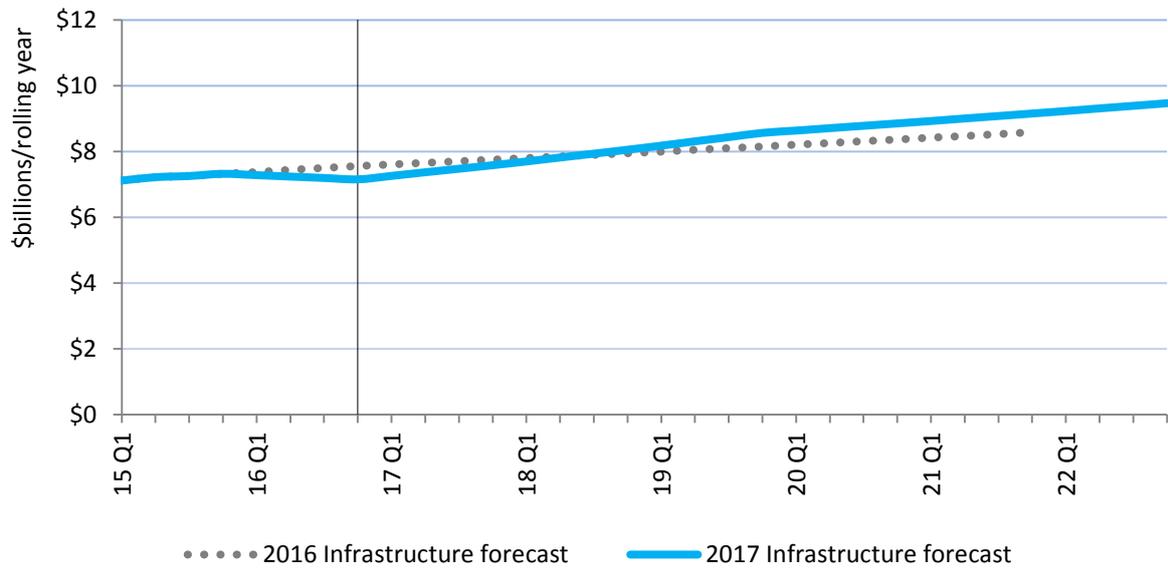


Source: Pacifecon / BRANZ

Infrastructure forecast comparison

The value of infrastructure has typically had the least change from year to year when compared to residential and non-residential building activity. Infrastructure activity levels in 2016 reduced by 2.3% rather than the 3.3% growth we had forecast. Infrastructure and non-residential building forecasting methodology was refined for this year's report, including forecasting at a regional level.

Figure 5-4 Infrastructure nationally 2016 and 2017 forecasts compared

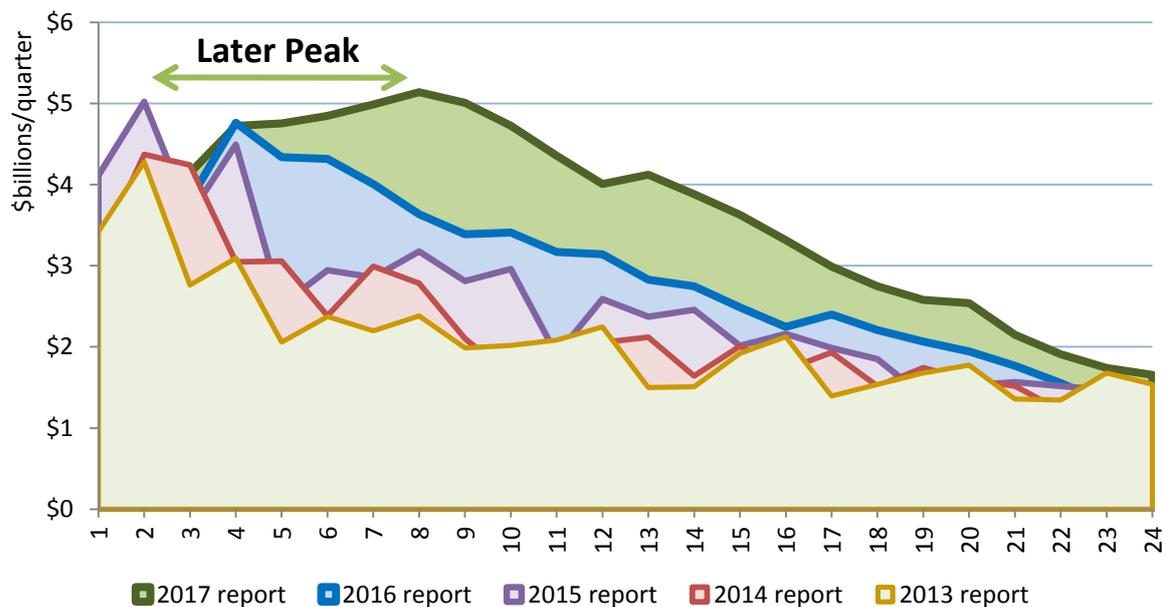


Source: Pacifecon / BRANZ

5.3 Comparison of Pacifecon’s 2017 known project data with the previous reports

Pacifecon’s dataset contains anticipated values and start dates for non-residential buildings and infrastructure construction projects. This section compares the next six years of Pacifecon’s 2017 known data with the six years of known data used for preceding reports. This comparison shows a similar *optimism bias* in the data series, ie a higher value of all non-residential construction is anticipated to start around the second and fourth quarter of the data series than occurs in practice. There is a later peak in this year’s data in than previously, and this may be the result of a number of large projects over one hundred million in the pipeline. It is clear that this year’s known data represents a greater volume of intentions in the pipeline than any previous reports.

Figure 5-5 Value of all Pacifecon known, non-residential project data, by report year



Source: Pacifecon

5.4 Comparison of previous reports project intentions with project outcomes

Pacifecon’s dataset shows an increase in the intentions for projects totalling over \$100 million, indicating growth in very large projects expected in infrastructure and non-residential buildings in the coming years. [Section 5.4](#) describes the *optimism bias* behind the early peak in Pacifecon’s projections. Comparing the projections with what happens over time can inform how to accurately adjust for this bias.

Table 5-1 compares what was projected with what actually happened over the four previous reports. The 2016 report included 29 known projects valued \$100 million and over that were anticipated to start between 1 April 2016 and 31 March 2017. 15 of the 29 projects, just over half started as anticipated. The number of known projects valued \$100 million and over expected to start between 1 April 2017 and 31 March 2018 has grown from 29 to 36 projects.

Table 5-1 Outcome of projects valued \$100 million and over anticipated to start in previous reports

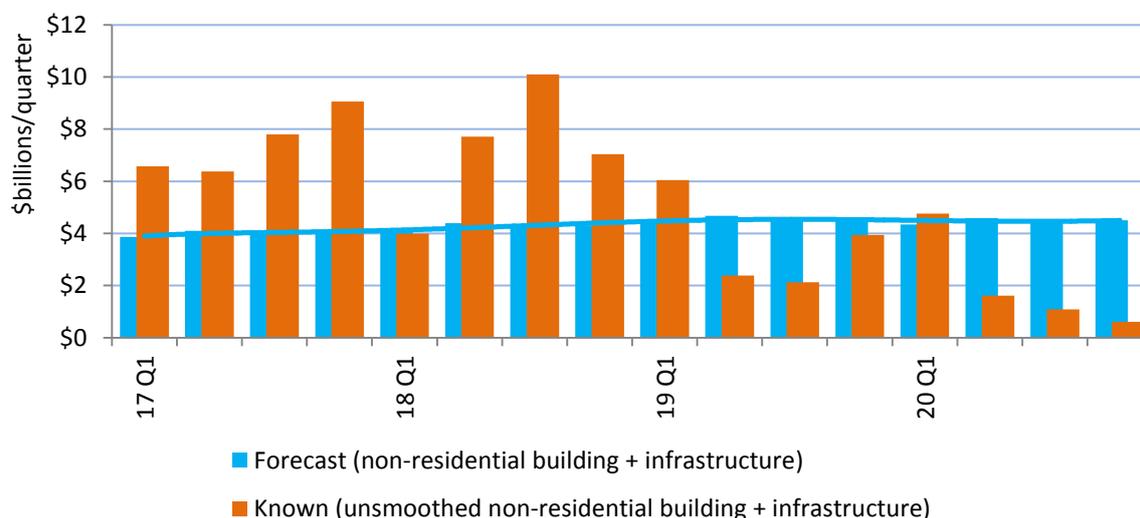
Outcome	Number of projects 2013 report	Number of projects 2014 report	Number of Projects 2015 report	Number of Projects 2016 report
Started as anticipated	17	9	15	15
Anticipated to start within the coming year	5	8	3	10
Start date anticipated beyond 1 year	7	3	0	4
Cancelled since previous report	1	0	2	0
Total	30	20	20	29
Additional projects starting ²⁵	3	11	8	7
Number of projects started in time frame	20	20	26	22

Source: Pacifecon

5.5 Construction intentions and ‘optimism bias’

All intentions in building and construction come with some level of over-confidence, as many projects may lag behind their original timelines or occasionally be cancelled, this is termed *optimism bias*. This optimism bias of all non-residential building and infrastructure intentions in the Pacifecon dataset can be seen clearly in the raw (un-smoothed) data, with a higher than expected number of known projects showing over the short-term (about the next 2 years), and the lower than forecast number of known projects over the longer term (2 years and beyond).

Figure 5-6 All non-residential building and infrastructure intentions ‘raw’ data (un-smoothed)



Source: Pacifecon

²⁵ Additional projects starting since the 2016 report: three projects new to Pacifecon (includes Kaikoura SH1 repair), one projects value raised to over \$100m prior to commencing, three projects accelerated so that they started within the April 2016 - March 2017 time period.

5.6 Pacifecon's refinement of the 'smoothing' process

The total number of projects reported on by Pacifecon has increased from over 6,000 projects in the first report to over 8,000 for the current report. Optimism bias needs to be accounted for when using the project intentions to forecast activity. Not all projects that are in the planning process will progress into actual constructions at the intended value and time. To account for this optimism bias in the dataset, Pacifecon undertakes a 'smoothing' process to prepare the data for the forecasts.

Pacifecon has consistently refined the smoothing process by studying the highest value projects to ascertain the most likely allocation of their value of work to the pipeline:

- In the first report projects over \$100 million were individually scrutinised,
- in the second report projects over \$90 million,
- for the third report projects over \$75 million,
- for the fourth projects over \$60 million, and
- for this fifth pipeline report all projects over \$50 million.

The thousands of lower value projects are smoothed by the following parameters:

- \$50m+ value (and back in time to January 2011) projects individually examined and value of work spread out over researched number of quarters
- \$30m to <\$50m, value of work is spread over six quarters
- \$5m to <\$30m , value of work is spread over four quarters
- <\$5m, value of work allocated to one quarter.

6 Disclaimer

Pacifecon (NZ) Ltd. does not typically use its database for this type of analysis. This has required additional data manipulation and changes to its database and processes. Over time, the techniques and processes may be further refined.

Advice has been taken from a variety of sources. It is believed that the methodology used is a sound basis for future reporting.

All reasonable care has been taken in gathering, compiling and furnishing the information specified herein, but Pacifecon (NZ) Ltd and BRANZ will not be responsible for errors, omissions, inaccuracies or lateness; or liable for any claims, actions or suits arising directly or indirectly therefrom.

Your feedback is welcome at feedback.pipeline@mbie.govt.nz

7 Appendices

7.1 Appendix A – About the parties involved in preparing this report

Pacifecon was established in 1982. It is a wholly New Zealand operated business focusing exclusively on the New Zealand and Pacific Islands construction industry, providing business intelligence in the form of future residential and non-residential project information to its client base.

Pacifecon uses a nationwide team of 30 people to liaise with key decision makers in the construction industry (in both the private and public sectors) to compile thorough, timely and accurate information on building projects from the earliest planning stages. Newspapers, journals, industry publications and websites are checked for relevant information, as well as consents. Information is held on projects that may have a work start date far beyond 2022.

www.pacifecon.co.nz

BRANZ is an independent and impartial research, testing, consulting and information company providing services and resources for the building industry.

Its aims are to:

- research and investigate the design, construction and performance of buildings that impact on the built environment in New Zealand, and
- enable the transfer of knowledge from the research community into the residential and commercial building and construction industry.

www.branz.co.nz

Ministry of Business, Innovation and Employment (MBIE)'s purpose is to 'grow New Zealand for all'. MBIE does this by helping businesses become more productive and internationally competitive, and by increasing opportunities for all New Zealanders to contribute to the economy. This means providing more jobs and increasing the opportunities for New Zealanders to participate in more productive and higher paid work. Growth for all also means providing better quality housing that is safe and affordable for New Zealanders.

www.mbie.govt.nz

7.2 Appendix B – Terminology, abbreviations and definitions used in this report

Actuals	Values that have been realised and collated to form data based on fact.
Additions and alterations	Changes or additions to an existing building or structure. These include repair work post-earthquake.
Apartment	Any dwelling unit that is attached to another dwelling unit above or below it is considered an apartment, and any dwelling unit that is a part of a commercial building. Apartments in retirement villages are not included, but categorised as <i>retirement village units</i> .
b	Billion (1,000,000,000 or 10 ⁹).
Base year	The year beginning 1 January 2015.
Boom-bust	A boom-bust cycle is a process of economic expansion (boom) and contraction (bust) that occurs repeatedly.
Commercial construction	A subset of non-residential construction which includes: shopping centres and retail outlets, hotels, motels, conference centres, theatres, libraries, museums, offices, welfare homes, hostels, laboratories, telecommunications and electronics, churches, bars, restaurants, defence, law, police stations, prisons, camp grounds, buildings with a commercial kitchen, etc.
Constant 2016 dollars	Real New Zealand dollar value as at December 2016. All values are at December 2016 quarter prices and are inflation adjusted using the capital goods price index (CGPI).
Detached dwelling	A detached dwelling is any stand-alone dwelling unit that is not attached to any other dwelling unit, ie a typical house on its own section.
Dwellings	Dwellings include detached (stand-alone) houses and multi-unit dwellings such as apartments, townhouses (terraced housing) and retirement village units.
Education construction	Includes: schools, childcare centres and universities.
Gross fixed capital formation	Net/gross increase in physical assets (investment minus disposals) within the measurement period. It does not account for the consumption (depreciation) of fixed capital, and also does not include land purchases. It is a component of the expenditure approach to calculating gross domestic product (expenditure). This report uses gross fixed capital formation. Routine maintenance is not included. Alterations and additions that significantly extend the life or capacity of an asset are included (ie all work done with an addition and alteration building consent) Refer to Appendix C for further explanation of use.
Forecast period	The six year period from 1 January 2017 to 31 December 2022.

Gross Domestic Product (expenditure)	A measure of the final purchases of goods and services produced in New Zealand's domestic territory. Exports are added to domestic consumption as they represent goods and services produced in New Zealand. Imports are subtracted as they represent goods and services produced by other economies.
Health construction	Includes: hospitals, hospices, rest homes, health centres, ambulance stations, Plunket rooms, etc.
Heavy industry/energy construction	Includes: mines, wind farms, plant and equipment, cranes, service stations, hydro, dams, irrigation, electricity, etc.
Infrastructure	Horizontal structures (often civil works) including: roads, bridges, tunnels, reservoirs, street lighting, runways, harbours, marinas, dredging/flood control, outlets to the sea, subdivisions, earthmoving, landscaping, parks, demolitions, transport and car park buildings, bus stops, water supply and wastewater, refuse, landfill (described as 'other construction' in previous reports).
Industrial construction	Includes: breweries, airports, harbours, ports and terminals, railways, warehouses, fire stations, abattoirs, cold stores, fisheries, boatsheds, marine farms, fuel storage, tankage for service stations, wineries, milk factories, dairy farms, laboratories.
Known projects	Construction projects included in the Pacifecon data set. Projections are based on the expected construction costs over time of these known projects. It is an extensive, but not complete list of construction intentions in New Zealand.
Multi-category construction	Development falls into multiple categories.
Multi-unit dwelling	Separate occupancy dwelling with either/and a wall, ceiling or floor in common with another building, including all retirement village units whether attached or not.
National Infrastructure Unit	Based within the Treasury. Its responsibilities include: <ul style="list-style-type: none"> • formulating, and monitoring progress on, a 30-year National Infrastructure Plan (NIP) • establishing robust and reliable cross-government frameworks for infrastructure project appraisal and capital asset management, and monitoring the implementation and use of those frameworks, and • providing support to, and acting as a secretariat for, the National Infrastructure Advisory Board.
All non-residential construction, or all non-residential building and infrastructure	The combination of both non-residential building and 'infrastructure' as defined below.

Non-residential building	Vertical structures, including: shopping centres and retail outlets, hotels, motels, conference centres, theatres, libraries, museums, offices, welfare homes, hostels, laboratories, telecommunications and electronics, churches, clubs, bars, restaurants, defence, law, security, police stations, prisons, camp grounds. Values include additions and alterations.
Optimism bias	The over-estimate of construction intentions in the first year of the known projects data – see Section 5.4 for a full description.
Other construction	Other construction is described as infrastructure in this report, see Infrastructure .
The Productivity Partnership	The Building and Construction Productivity Partnership was a partnership between industry and government established from 2011-2014 to address the issue of low productivity in the sector. The partnership developed a range of research and evidence on sector productivity issues.
Project initiator - Central government	Projects that may be paid with central government funding or in partnership with the private sector, but with central government as the driving force behind the project.
Project initiator - Private	The private sector.
Project initiator -Local government	All council and local projects which may be paid for from local government funding or in partnership with the private sector, but with local government as the driving force behind the project.
Quarters	Q1 Jan-Mar, Q2 Apr-Jun, Q3 Jul-Sept, Q4 Oct-Dec.
Raw data	Data that has not been subject to smoothing, processing or any other manipulation.
Residential building	Includes houses and multi-unit dwellings. Value of residential building includes the value of additions and alterations. The number of residential consents excludes additions and alterations.
Retirement village units	All retirement village units, from detached houses to apartments and rooms, are included in the retirement village units category of residential building. The common areas (dining, TV rooms, kitchens, gyms, pools, health centres, etc) are captured in ‘non-residential building’. This split is accounted for in the forecasts.
Roads of national significance	Seven State highway projects identified by the New Zealand Transport Agency as strategically significant investments needed to enable New Zealand’s economic growth. Other roads of national significance may be added in the future http://www.nzta.govt.nz/roads-and-rail/state-highway-projects/roads-of-national-significance-rons

Rolling years	The aggregate of values from the 12 months immediately preceding a particular point in time (eg 2017 Q2 is the aggregate of values from July 2016 through June 2017).
Smoothed	Spreading the total cost of a project over its intended duration to provide a clearer view of underlying trends and remove seasonal or cyclical components.
Special Housing Areas	Special Housing Areas (SHAs) are areas recommended by local government and approved by central government in districts that have housing affordability and supply issues. Housing developments within SHAs have access to more streamlined consent process in order to fast-track development of housing (including affordable housing).
Sport construction	swimming pools, sports centres, sports pitches and golf courses.
Statistics NZ	A government department and New Zealand's national statistical office. New Zealand's major source of official statistics, administers the Statistics Act 1975, and leads the Official Statistics System. See www.stats.govt.nz
Townhouses, flats, units and other dwellings	Other than a dwelling unit that is considered a detached dwelling , an apartment , or a retirement village unit , all dwelling units that are attached side-by-side to another dwelling unit are included in this category. A 'terraced house' is included in this category as is a minor dwelling or 'granny flat'
Years	Refers to the calendar year. The 12 months ending 31 December of the year referred to.

7.3 Appendix C – Methodology, data, statistics and assumptions used in this report

The forecasting that provides the basis for this report was completed on 1st June 2017, based on Statistics NZ March 2017 release of 2016 Gross fixed capital formation data.

Gross Fixed Capital Formation²⁶

Gross Fixed Capital Formation is an element of Statistics NZ's system of National Accounts; it is a subset of Gross Domestic Product. Values in the National Construction Pipeline Report are based on Gross Fixed Capital Formation, more specifically the three fixed capital asset classes of; residential buildings, non-residential buildings and other construction (infrastructure).

The gross fixed capital formation measure has the benefit of including all types of construction and, therefore, provides a common measure across the three activity types of *residential building*, *non-residential building* and *infrastructure*. Infrastructure is not included in other building statistics, such as building consent data and Statistics NZ's building activity survey, as this activity type does not typically require a building consent. Economic indicators, including building consent data, are overlaid and adjusted to the gross fixed capital base.

Gross Fixed Capital Formation covers a broader view of the costs of construction than the 'contract value' supplied with a consent application. It includes the final cost of the construction to the final user, including:

- costs prior to the application for consent, such as any feasibility studies and professional fees, and
- outlying costs, including subdivision works, costs of financing, legal / real estate fees, and any developer profit.

Statistics NZ includes a number of measures to balance the National Accounts, which captures building and construction work that does not require a building consent. The gross fixed capital measure, as a result, includes adjustments to include activities not captured in consent data.

²⁶ Statistics NZ's definition: Gross fixed capital formation is a measure of the net new investment by producers on durable real assets, such as buildings, motor vehicles, plant and machinery, roading, and improvements to land. In measuring the outlays, sales of similar goods are deducted. Land is excluded from gross fixed capital formation.

Residential methodology

The residential sector forecasts in this report are produced by BRANZ and are based on modelling historical building consents and economic forecast indicators. This sector has much shorter lead-times than the non-residential sector.

Key assumptions are:

- 'Value of work' which include detached houses, multi-unit dwellings and additions and alterations work. Value of work is based on new dwelling and alteration and addition consent values, multiplied by 1.74 for residential building to allow for variations after consent time and other costs included in the fixed capital formation measure. The multiplication factor is from historic ratios of fixed capital formation / consents values.
- Based on Statistics NZ December 2015 household formation sub-national projections, using a scenario midway between their high and medium scenario. This gives a net migration of 60,000 per year in 2017 declining to 20,000 per year in 2022.
- We have assumed a direct relationship between an increase in household numbers and demand for new dwelling construction.
- We have assumed zero unsatisfied demand at the 2013 census.
- Demolition replacements are assumed to be 1,000 per year.
- New, occasionally occupied dwellings (holiday homes) are assumed to be 500 per year.
- The net result is an average of 33,000 dwellings per annum through to 2023.
- Historic consents are first published data and there may be subsequent changes in some locations. Usually these revisions are minor.
- A nine month time lag is assumed between consent and value of work completed.

Changes in residential methodology from the 2016 report

Assumptions used to forecast residential fixed capital formation have changed from the 2016 report.

Changes include:

- The 2016 report used a different weighting of household formation sub-national projections of 75% medium and 25% high, the 2017 report uses a scenario midway between their high and medium scenario.
- The net migration assumption in the last report was 18,000 per year.
- The distribution of work across quarterly seasons has been adjusted, based on changes in previous seasonal distribution of work.
- The total number of forecast residential consents in Auckland is capped at 12,000 dwellings this year, growing to approximately 13,200 per year from 2017 to the end of the forecast period. This reflects the need for time to allow the industry to grow.

All non-residential building and infrastructure

The non-residential building and infrastructure forecasts are based on BRANZ forecasts and charted alongside known project data held by Pacifecon.

Non-residential building methodology

BRANZ forecasts of non-residential buildings are based on forecasts of non-residential building consent values. The consent values are multiplied by a factor of 1.35 for fixed capital formation using historic ratios between consents and fixed capital formation value, and allowing for an average twelve month lag between consent and value of work completed.

Ten categories of non-residential consents are forecast, based on the Statistics NZ data. Single equation regression models have been developed for most of the categories.

Infrastructure methodology

BRANZ forecasts for infrastructure are based on modelling the historic trends for industry commissioning (and ownership) of assets and expected growth in each sector. The five main sectors are:

- mining (about 12% of other construction fixed capital formation),
- electricity / gas / water sectors (33%),
- transport (34%),
- telecommunications (9%), and
- other (12%).

Real growth is based on historic trends and planned work (eg, the Government Policy Statement on Land Transport Funding). Real growth in fixed capital formation for the five sectors is assumed to be -1% per year for mining, 4% per year for electricity/gas/water, 5% per year for telecommunications, and 1% per year for other infrastructure works. Transport is expected to have 11% per year growth to 2018 then reduce to 4% per year growth.

Pacifecon's anticipated non-residential projects

A data set of over 8,000 future projects known to Pacifecon has been used in this report. The data is up to date as at 12 February 2017. Smoothed data as at 12 May 2017 has been used in this report. The Pacifecon data set of project values shows the value of all projects of \$5m and over, smoothed across future quarters for the duration of the project (as far as this is known or estimated). Work on all non-residential construction started since the beginning of 2011, and which is still in progress, is also included. The data set includes both non-residential building and infrastructure.

Pacifecon's non-residential data used in this report consists of projects which are at pre-construction stages, from the very earliest planning through to tendering. This real project activity data is collected and retained by Pacifecon. In general, Pacifecon does not report on:

- projects valued at less than \$100,000 (unless linked to other larger projects), and
- projects under \$200,000, where there is no opportunity for Pacifecon clients.

7.4 Appendix D – Projects likely to start within the next year²⁷ valued over \$100 million²⁸

Table 7-1 Non-Residential Building Projects likely to start within the next year valued over \$100 million

Region	Type	Project Initiator
Auckland		
Sylvia Park	Retail Development	Private
Newmarket Shopping Centre	Retail Development	Private
Offices	Commercial Building	Private
Healthcare Campus	Industrial Buildings	Private
The Pacifica	Mixed Use Development	Private
Auckland Airport Terminal Integration, Phase 5	Airport	Private
North Shore Retail	Mixed Use Development	Private
Auckland Airport Expansion Phase 6	Airport	Private
Commercial/Industrial Development	Mixed-Use	Private
Commercial Tower	Mixed-Use	Private
University of Auckland Engineering Building	University	Central Govt
Mt Eden Prison	Prison	Central Govt
Precinct Plan	Town Centre	Local Govt
Wynyard Quarter Marine Precinct		Commercial
Maintenance Services	Commercial	Local Govt
Canterbury		
Convention Centre Precinct	Convention Centre EQ	Central Govt
Canterbury Provincial Chambers Buildings	Heritage Building EQ	Local Govt
Metro Sports Facility	Sports Facility EQ	Local Govt
Nga Puna Wai Sports Hub	Sports Complex EQ	Local Govt
Waikato/Bay of Plenty		
Dairy Processing Plant	Dairy	Private
Te Rapa Gateway Industrial Stage 1	Industrial Subdivision	Private
Wellington		
Johnsonville Shopping Centre	Commercial	Private
Rest of New Zealand		
Retirement facilities	Mixed Use	Private
Telecommunications	Commercial	Central Govt

Source: Pacifecon

²⁷ Year is the 12 months ending 31 March 2018.

²⁸ Inclusion of a project does not mean it will proceed to the scale and timeframe indicated above. It is, however, the best available picture at this point in time (12 May 2017). Pacifecon's building and construction information is constantly updated.

Table 7-2 Infrastructure Projects likely to start within the next year valued over \$100 million

Region	Type	Project Initiator
Auckland		
Grafton Downs Civil Works	Civil Works	Private
Kingseat Village Subdivision	Subdivision	Private
Residential Subdivision	Civil	Private
Auckland Transport	Roads	Local Govt
City Rail Link Stations & Tunnels	Railway Tunnel	Local Govt
City Rail Link Systems	Railway Tunnel	Local Govt
Canterbury		
Road Maintenance	Civil	Local Govt
Waikato/Bay of Plenty		
Power Station	Heavy Industry	Private
Maunganui/Girven Road Intersection	Roads	Central Govt
Mangawara Stream Bridge	Civil	Local Govt
Region	Type	Project Initiator
Wellington		
Peka Peka to Otaki Expressway SH 1	Roads	Central Govt
Rest of New Zealand		
Wind Farm	Heavy Industry	Private

Source: Pacifecon

7.5 Appendix E – Forecast and known data table

Table 7-3 Forecast and known data (\$ billions) by region – annual totals²⁹

Residential	Actual		Forecast						
	2015	2016	2017	2018	2019	2020	2021	2022	Total
Auckland	6.3 ³⁰	7.4	8.1	9.2	9.6	10.1	10.1	9.8	70.6
Canterbury	4.2	3.7	3.9	3.6	3.6	3.6	3.4	3.1	29.1
Waikato/BoP	2.9	3.5	4.0	4.4	4.5	4.6	4.5	4.2	32.7
Wellington	1.0	1.2	1.4	1.4	1.5	1.6	1.6	1.5	11.2
Rest of NZ	3.3	3.9	4.6	4.5	4.7	4.7	4.5	4.1	34.2
TOTAL	17.8	19.7	21.9	23.2	23.9	24.5	24.1	22.7	177.8
Non-residential building									
Auckland	2.0	2.3	3.1	3.5	3.9	3.8	3.5	3.5	25.6
Canterbury	2.0	2.4	2.2	2.3	2.3	2.0	1.6	1.4	16.0
Waikato/BoP	0.8	0.9	0.9	1.1	1.2	1.2	1.1	1.1	8.2
Wellington	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.3	4.3
Rest of NZ	1.3	1.2	1.5	1.6	1.7	1.6	1.4	1.3	11.6
TOTAL	6.6	7.4	8.3	9.0	9.6	9.0	7.9	7.7	65.7
Infrastructure									
Auckland	3.0	2.9	3.1	3.3	3.6	3.7	3.8	3.9	27.4
Canterbury	1.1	1.0	1.1	1.2	1.2	1.3	1.3	1.3	9.5
Waikato/BoP	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8	12.3
Wellington	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	5.0
Rest of NZ	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	12.1
TOTAL	7.3	7.2	7.6	8.1	8.6	8.9	9.2	9.5	66.2
All construction									
Auckland	11.3	12.7	14.3	16.1	17.0	17.5	17.4	17.2	123.6
Canterbury	7.2	7.2	7.2	7.0	7.1	6.8	6.3	5.8	54.6
Waikato/BoP	5.0	5.7	6.3	7.0	7.3	7.4	7.3	7.1	53.1
Wellington	2.2	2.4	2.5	2.7	2.8	2.7	2.6	2.5	20.4
Rest of NZ	5.9	6.5	7.5	7.6	7.9	7.8	7.5	7.1	57.9
TOTAL	31.7	34.3	37.8	40.3	42.1	42.4	41.2	39.9	309.7
Known Non-residential building									
Auckland	2.5	2.11	3.4	4.4	3.6	2.9	1.8	1.0	21.8
Canterbury	1.9	1.5	2.3	2.5	1.9	1.4	1.0	0.6	13.1
Waikato/BoP	0.7	0.3	0.9	1.4	1.2	1.2	0.7	0.3	6.6
Wellington	0.5	0.5	0.5	0.7	0.6	0.4	0.2	0.2	3.6
Rest of NZ	1.1	1.0	1.2	1.8	1.7	1.4	0.8	0.5	9.5
TOTAL	6.8	5.4	8.4	10.7	9.0	7.2	4.5	2.6	54.6
Known Infrastructure									
Auckland	2.8	2.4	2.4	3.7	3.7	3.0	2.9	2.6	23.4
Canterbury	1.2	1.0	1.2	1.3	1.3	1.1	1.0	0.6	8.7
Waikato/BoP	1.1	0.9	1.4	1.6	1.6	1.3	0.9	0.6	9.4
Wellington	0.5	0.4	0.6	0.6	0.6	0.6	0.4	0.3	4.1
Rest of NZ	1.3	1.0	1.1	1.4	1.3	1.3	1.0	0.7	9.1
TOTAL	7.0	5.6	6.6	8.6	8.6	7.3	6.2	4.8	54.7

²⁹ Any differences between figures within Appendix E and other tables and charts in this report are due to rounding to two significant figures.

³⁰ Actuals are shown in blue. Highest value between 2015 and 2022 are shown in red.

7.6 Appendix F – Residential dwelling actual and forecast data table

Table 7-4 Residential dwelling numbers actual consented and forecast, by region – annual totals³¹

Detached	Actual		Forecast							Total
	2015	2016	2017	2018	2019	2020	2021	2022		
Auckland	5,185 ³²	5,660	6,300	6,600	6,900	6,900	6,400	6,100	49,900	
Canterbury	4,696	4,119	3,400	3,400	3,400	3,200	2,800	2,600	27,700	
Waikato/Bo	4,041	5,005	5,400	5,600	5,700	5,600	5,000	4,800	41,100	
Wellington	982	1,233	1,300	1,400	1,400	1,400	1,300	1,300	10,400	
Rest of NZ	4,132	5,290	5,500	5,500	5,500	5,300	4,700	4,300	40,200	
TOTAL	19,036	21,307	21,900	22,000	22,900	22,400	20,200	19,100	169,300	
Multi-Units										
Auckland	4,066	4,366	4,800	5,300	5,900	6,300	6,100	6,300	43,100	
Canterbury	1,793	1,784	1,900	2,000	2,100	2,100	2,000	1,900	15,700	
Waikato/Bo	860	1,067	1,200	1,300	1,500	1,600	1,500	1,600	10,700	
Wellington	739	759	800	900	1,000	1,100	1,000	1,100	7,500	
Rest of NZ	635	780	900	900	1,000	1,100	1,000	1,000	7,400	
TOTAL	8,093	8,756	9,600	10,600	11,600	12,100	11,800	11,900	84,400	
All dwellings										
Auckland	9,251	10,026	11,100	11,900	12,800	13,100	12,500	12,400	93,100 ³³	
Canterbury	6,489	5,903	5,400	5,400	5,500	5,300	4,800	4,500	43,400	
Waikato/Bo	4,901	6,072	6,600	6,900	7,200	7,100	6,600	6,400	51,800	
Wellington	1,721	1,992	2,100	2,300	2,500	2,500	2,400	2,400	17,900	
Rest of NZ	4,767	6,070	6,300	6,500	6,600	6,400	5,700	5,400	47,600	
TOTAL	27,129	30,063	31,500	33,000	34,500	34,500	32,000	31,000	253,700	

³¹ Any differences between figures within Appendix F and other tables and charts in this report are due to rounding to nearest 100.

³² Actuals are shown in blue. Highest value between 2015 and 2022 shown in red

³³ 94,200 new dwelling consents were forecast between January 2014 and December 2021 in the 2016 report.
94,400 new dwelling consents were forecast between January 2013 and December 2020 in the 2015 report.
70,800 new dwelling consents were forecast between January 2012 and December 2019 in the 2014 report.



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