National Construction Pipeline Report 2016

A Forecast of Building and Construction Activity

4th Edition

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

BRANZ

Pacifecon
Building intelligence

ABOUT THIS REPORT

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15 Stout Street
PO Box 1473
Wellington 6140

More information:
www.mbie.govt.nz
0800 20 90 20

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1 Introduction

This report was commissioned by the Ministry of Business, Innovation and Employment (MBIE) and jointly prepared by Pacifecon (NZ) Ltd and BRANZ. The Productivity Partnership commissioned the first report in 2013; this report is the fourth edition.

The report provides a forward view of national construction activity for the coming six years, ending on 31 December 2021. It includes illustrative graphs, tables and commentary on future and actual building and construction work, based on residential building forecasting by BRANZ, and Pacifecon data on known non-residential building and other construction intentions.

The report includes:

- a summary of the report's key findings[1]
- a national and regional forecast of construction value and dwelling consents
- a comparison of this year's forecasts against last year's, and

This edition of the report includes two feature areas:

1. a comprehensive look at historic (1991-2015) dwelling consent numbers for the different types of dwellings; ie *detached*[2], *retirement village units*, *apartments*, *townhouses, flats, units and other dwellings*, and
2. A focus on residential building for Waikato / Bay of Plenty region due to the increase in residential building activity in the area.

The aim of this report is to provide everyone interested in the construction sector, a clear 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* cycles that have negative impacts on productivity, employment, skill levels and quality in the construction sector.

We welcome any feedback you may have about this report; please email your feedback to feedback.pipeline@mbie.govt.nz

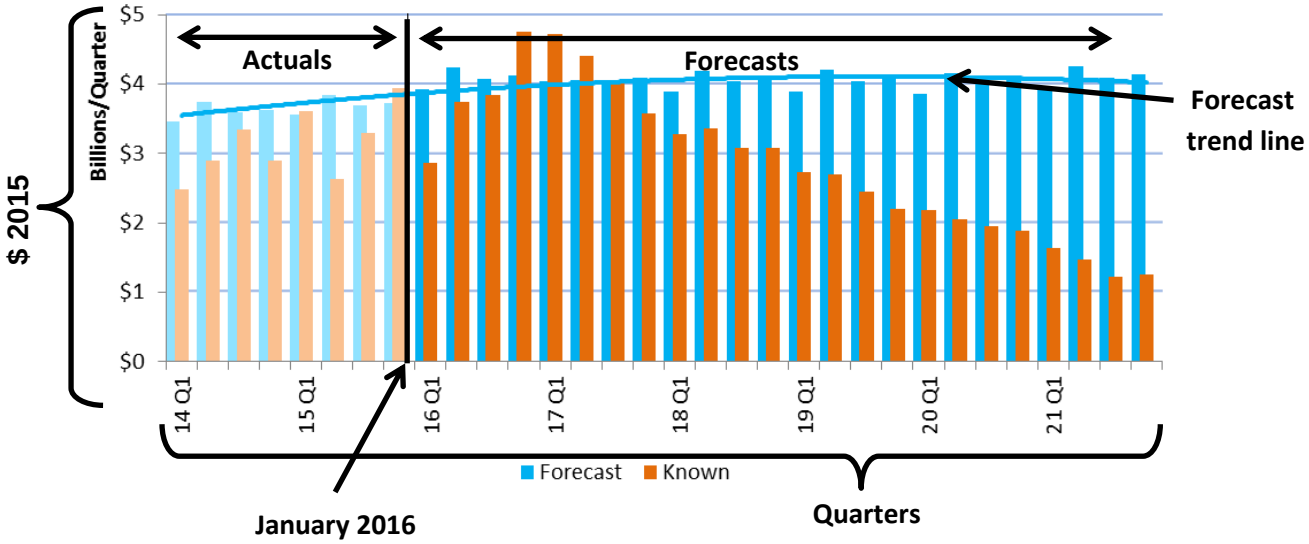
1 Words underlined in blue are links through to specific sections of the report. Click on the word to be taken to the section.

2 Words in *blue italics* are links through to a definition in Appendix B.. Click on the word to be taken to its definition.

1.1 How to read the graphs

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

Figure 1-1 Example Graph



Source: Pacifecon / BRANZ

- Values are in constant December 2015 dollars and are expressed in $billions per quarter or per year, unless otherwise stated, ie inflation has been removed from all dollar values.
- Values are for *gross fixed capital formation*, as reported by Statistics NZ (see Appendix C for further explanation of methodology).
- *Known projects* refer to construction projects included in the Pacifecon data set and projections are based on the expected construction costs over time of these known projects. It is not an exhaustive list of all construction projects.
- The forecast period is for six years from 1 January 2016 to 31 December 2021.
- *Years* are calendar years; the twelve months beginning January (unless otherwise stated).
- Where rolling years are used, each point on the graph represents the total of the 12 months immediately preceding that point, ie 2016 Q2 is the total of values from July 2015 through June 2016.
- *Quarters* are of the calendar year referred to, ie 2016 Q2 is the quarter from 1 April to 30 June 2016.
- *Actuals* actual values (from January 2014 through December 2015) have been included.
- The year beginning January 2014 is used as 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 generally shown in a lighter colour.
- Trend lines have been included to demonstrate the general direction the forecasts are heading.

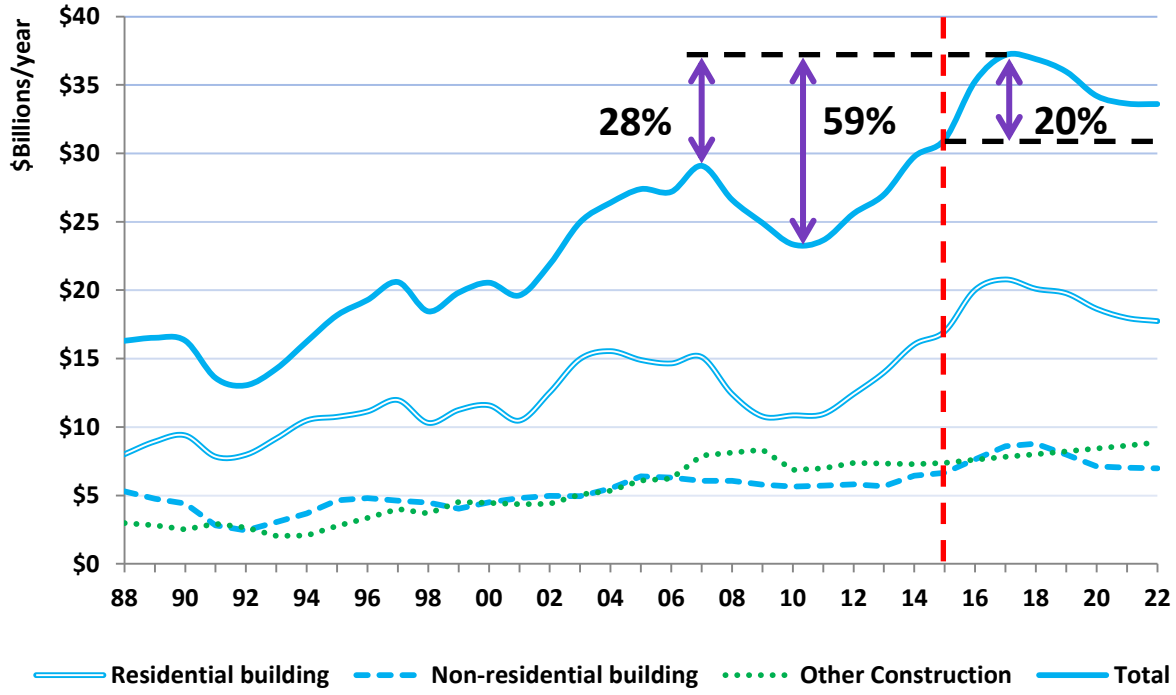
2 Key findings

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

2.1 Total national construction value has experienced sustained growth averaging 7% per year since 2011, and is expected to grow at this rate to 2017

The national value of all building and construction continues to rise, with a sustained rate of growth not seen in the last 40 years. These forecasts indicate a 2017 peak that represents 20% ($6.2b) more value than at the end of 2015. This peak is 28% higher than the previous peak in 2007 and 59% higher than the low of 2010, averaging 7% growth per year since 2011. Total national value is expected to remain above 2015 levels to the end of the forecast period.

Figure 2-1 Value of all construction nationally (historic and forecast)

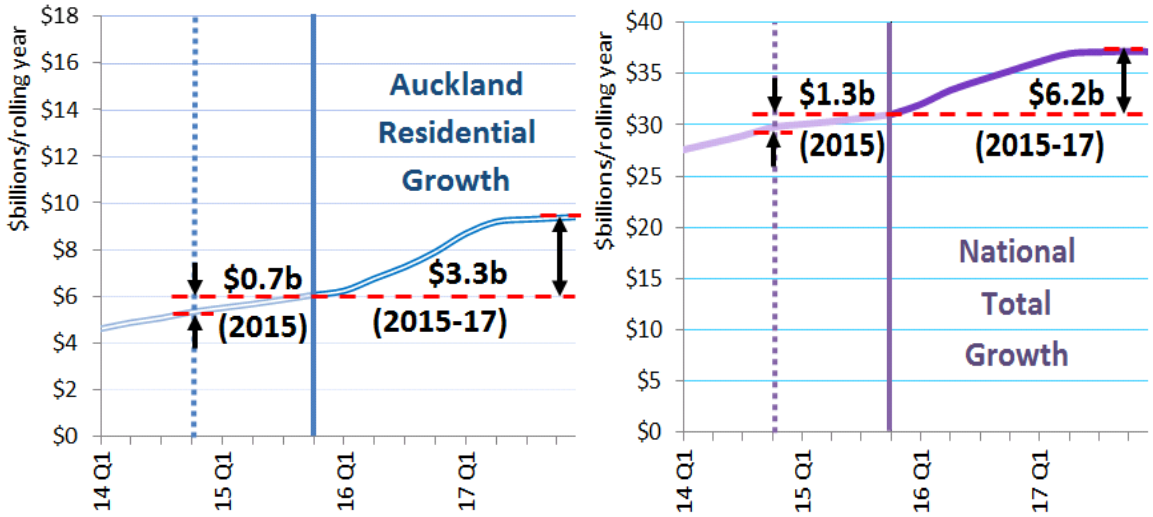


Source: BRANZ / Pacifecon

2.2 Residential building in Auckland accounts for more than half of the construction growth by value nationally

Auckland *residential building* value grew by $0.7b in 2015, accounting for 58% of the total national growth of $1.3 billion. Auckland residential building is projected to increase by another $3.3b by 2017, which represents 53% of the total national growth to the 2017 peak of $6.2b.

Figure 2-2 Total national construction growth compared to Auckland residential building growth

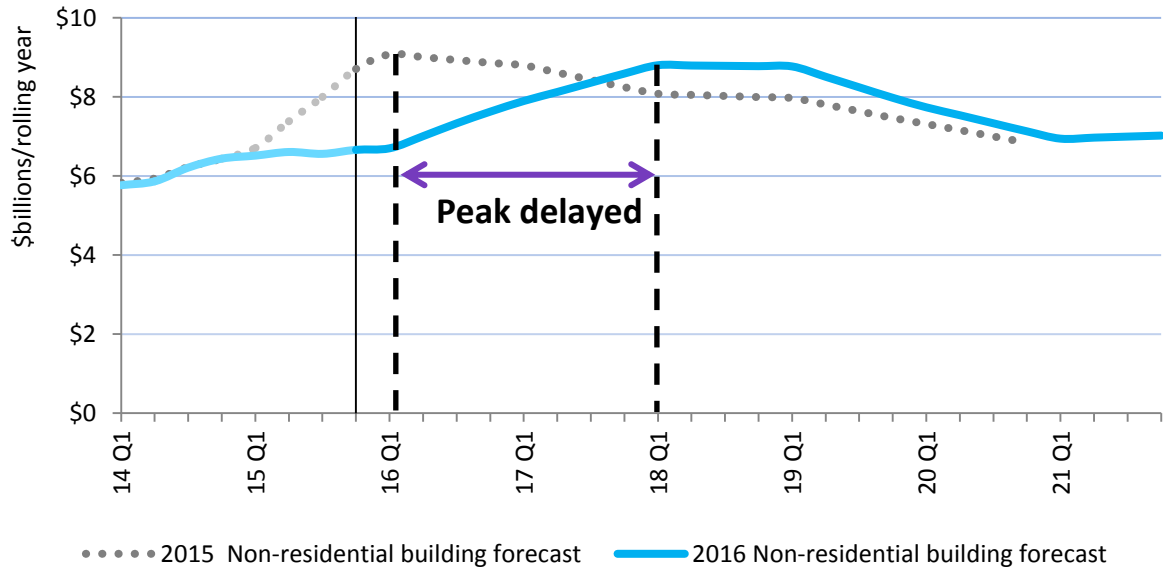


Source: Branz / Pacifecon

2.3 National non-residential building is now expected to have a later peak

The previous report's forecast for *non-residential building* was significantly higher than actual data recorded for 2015. Although we continue to project growth in non-residential building, consistent with the increase in the total value of construction intentions in the Pacifecon database, the growth is now more gradual with a later and longer peak ($8.8b) in 2018.

Figure 2-3 Non-residential building nationally 2015 and 2016 forecasts compared

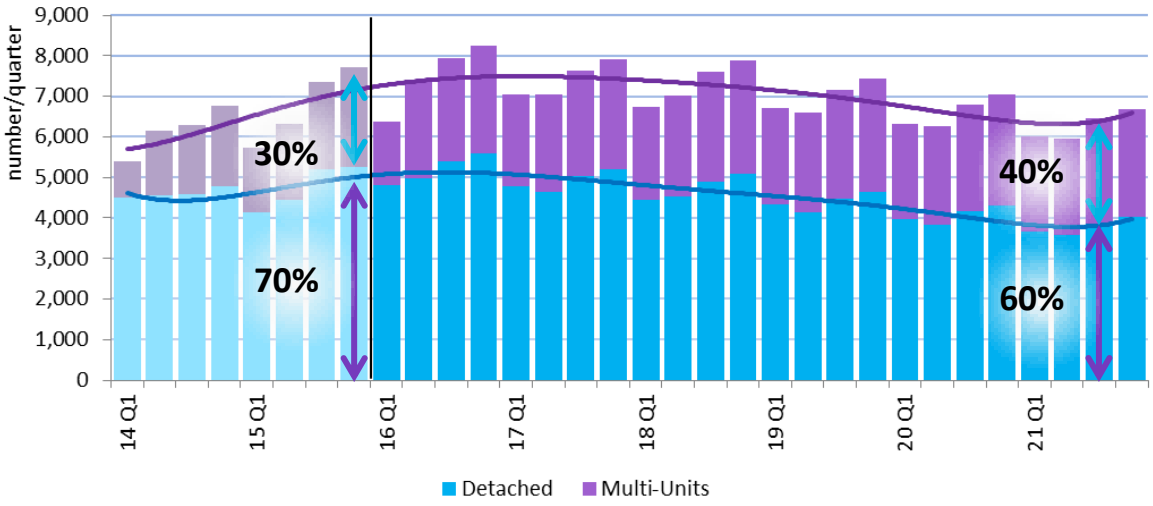


Source: Pacifecon / BRANZ

2.4 Multi-unit dwellings account for more than one in four dwellings consented in 2015

Higher density housing increases its share of national residential construction over the forecast period; multi-unit dwelling consents represented more than one in every four (30%) consented dwellings in 2015 and is projected to account for more than one in every three (40%) by the end of the forecast period.

Figure 2-4 Dwelling units consented nationally



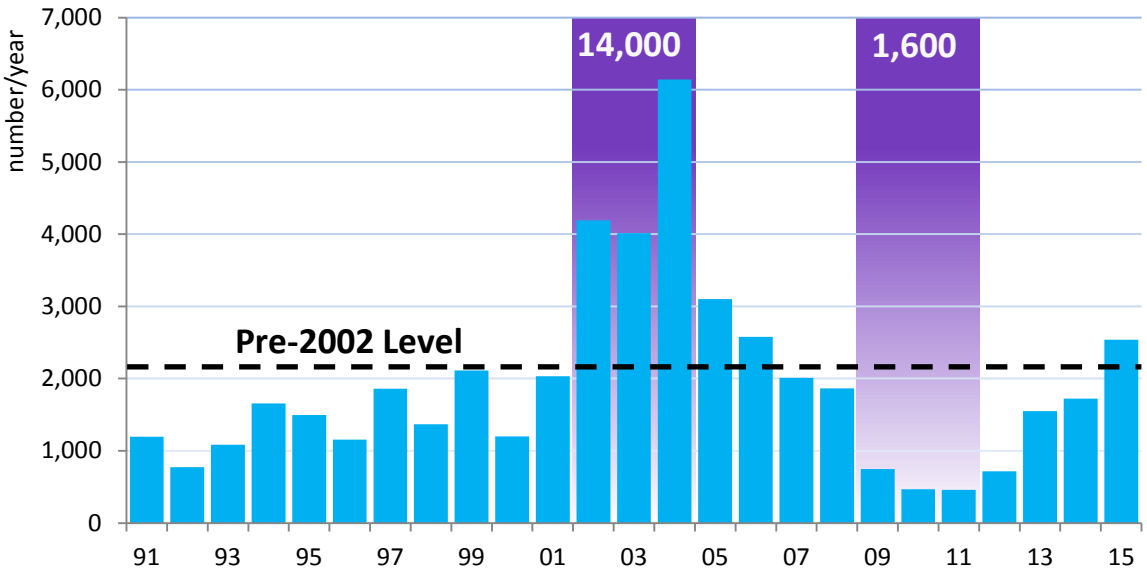
Source: BRANZ

2.5 Apartment consent activity shows variability, including a potential for fast growth

Auckland (18%) and Wellington (12%) are the only regions with ratios of apartments above the national ratio of all dwelling units (8%). Auckland apartments represent 72% of all apartments consented nationally for 2014-2015.

The apartment numbers vary significantly from year to year, doubling in 2002 and halving in 2005. More than 14,000 apartments were consented nationally in the years 2002-2004, followed by a decrease to 1,600 in years 2010-2012. Apartment activity has increased again since 2012, to above pre-2002 maximum levels, in 2015.

Figure 2-5 Apartments consented nationally (1991-2015)

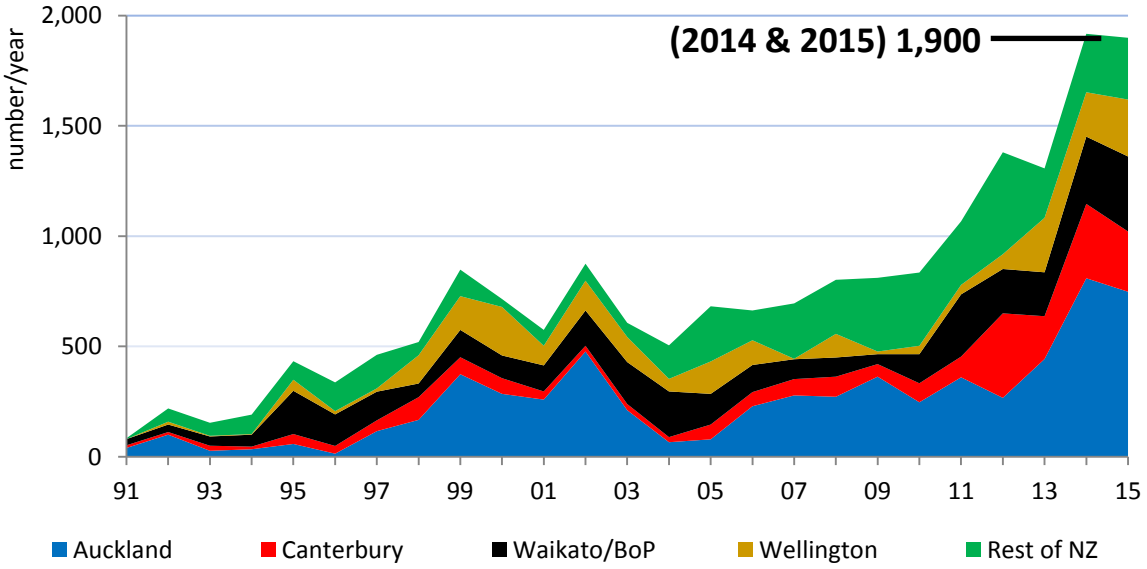


Source: Statistics NZ

2.6 Retirement unit consents at record high levels in the four main regions

Auckland, Canterbury, Waikato / Bay of Plenty and Wellington, all had record high levels of retirement unit consents in 2014, followed by similar levels in 2015. Canterbury has a lower percentage of retirement village units to dwelling units than the other regions. In both 2014 and 2015 highs of about 1,900 retirement village units were consented nationally; these include all units in retirement villages from detached houses to apartments and units.

Figure 2-6 Retirement village units consented nationally (1991-2015)



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 structures), other than residential
- *other construction* – structures of a non-building type (Horizontal structures) eg roads, subdivisions, infrastructure and civil works.

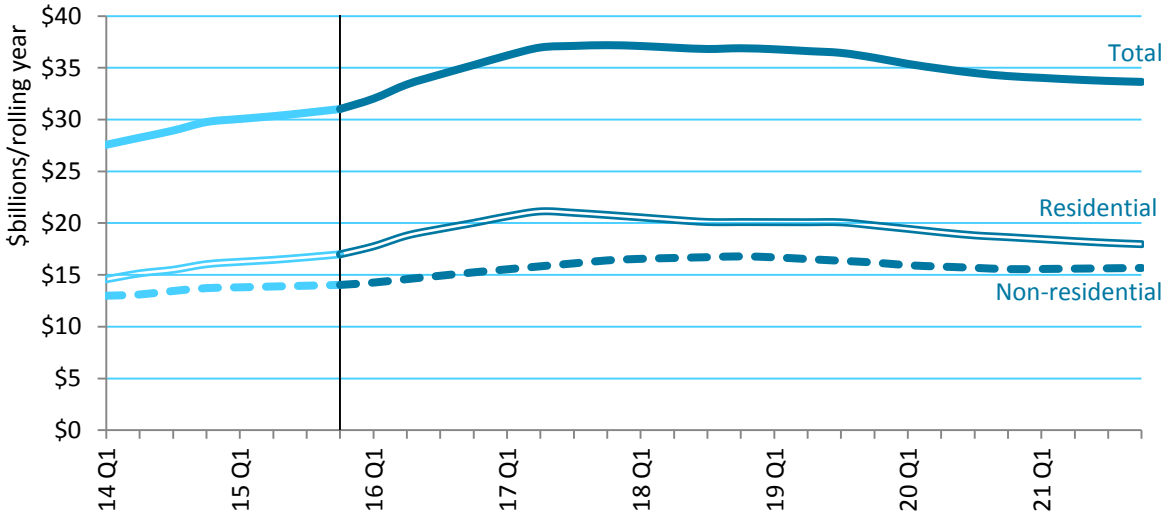
This section includes national forecasts for each activity type, it also discusses:

- the different types of residential construction historically
- the different types of non-residential building and other construction, and
- regional comparisons.

3.1 All national construction, by value

New Zealand continues to construct more by value than ever before with current levels of recorded activity reaching $31b for 2015 and continuing to climb. Value increased by 4% in 2015, and is expected to grow another 20% to a peak of $37b towards the end of 2017. The annual value of all construction nationally is forecast to remain above current elevated levels until 2021. The forecast shows a longer and later peak than previously forecast.

Figure 3-1 All construction nationally, by value

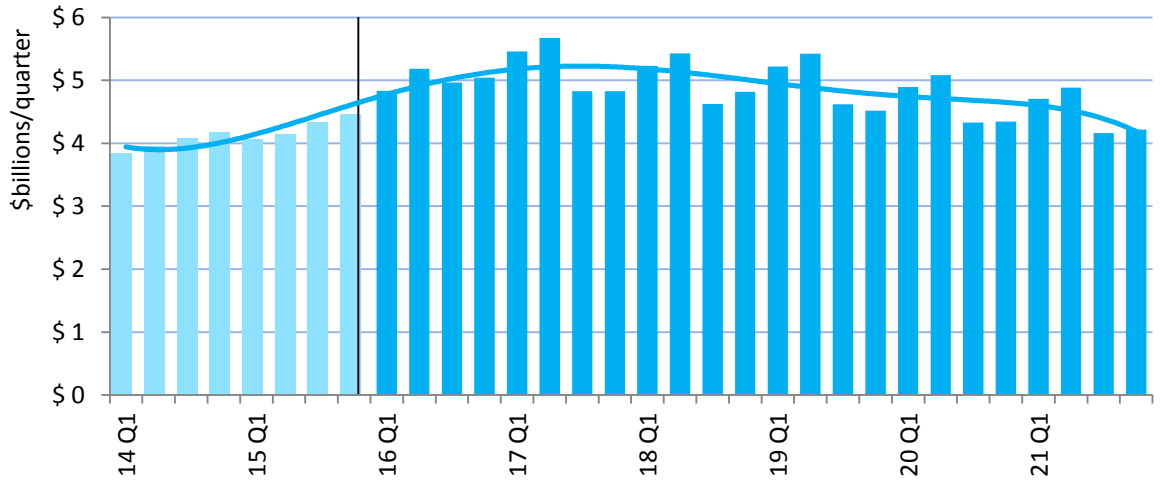


Source: BRANZ / Pacifecon

3.2 National residential, by value and dwelling number

Residential value increased by 6% in 2015, and is expected to increase 22% more to a peak of $21b in 2017. Activity reduces slightly from 2017—2021, but remains higher than 2015's level of activity by value throughout the forecast period.

Figure 3-2 Residential building nationally, by value

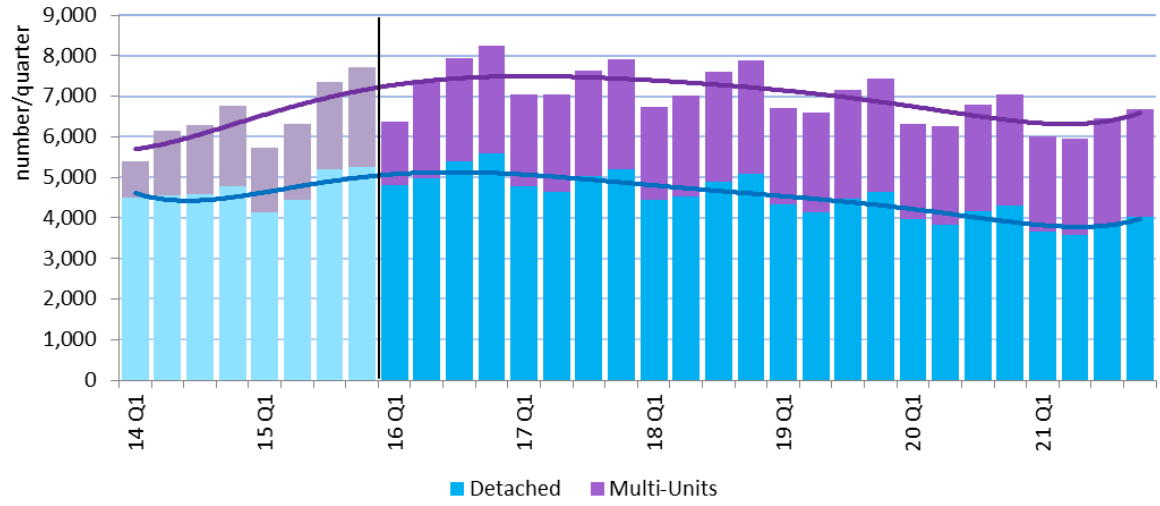


Source: BRANZ

Higher density housing increases its share of residential construction over the forecast period; multi-unit dwelling consents represented more than one in every four (30%) consented dwellings in 2015 and are projected to be more than one in every three (40%) by the end of the forecast period.

Although total national value has already passed previous peak levels, the number of consents is not forecast to exceed the previous peak of 31,000 in 2004, but is projected to remain at a high level of 25,000 – 30,000 per year for the duration of the forecast.

Figure 3-3 Dwelling units consented nationally



Source: BRANZ

3.3 Dwelling consent types nationally

Due to the increasing trend in multi-unit dwellings, an investigation into historical consent data for the different types of multi-unit dwellings has been undertaken in this year's report. Statistics NZ groups dwelling consent data into four types and two categories:

Detached category

- *detached dwelling* - Any stand-alone dwelling unit that is not attached to any other dwelling unit, ie a typical house on its own section.

Multi-unit category

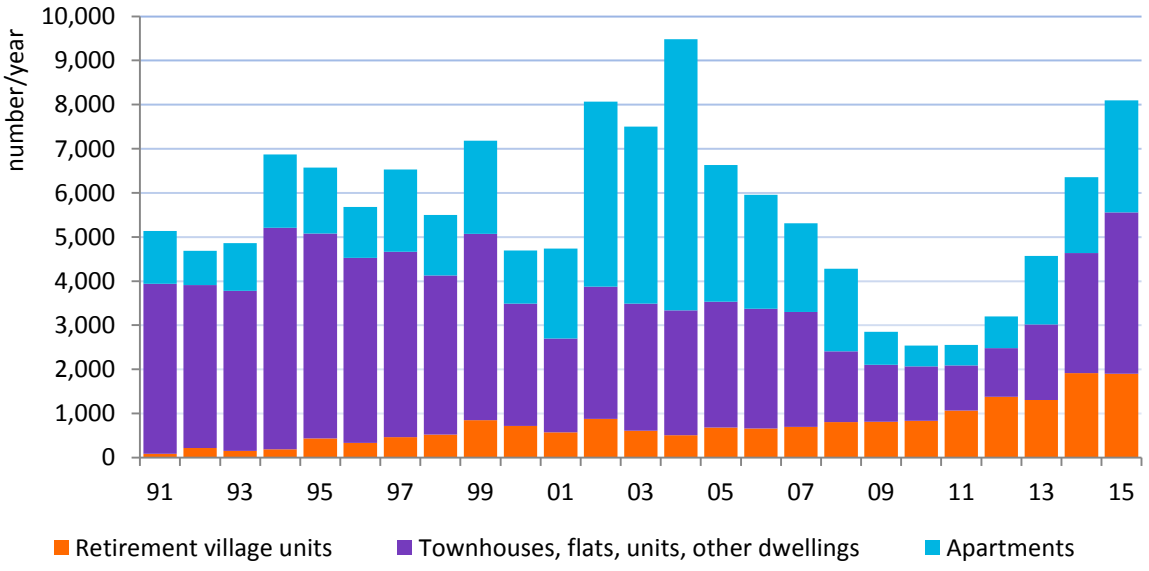
- *retirement village units* - dwellings specifically for retirement purposes from detached houses to apartments and rooms
- *apartments* - an apartment is defined as any dwelling with another dwelling above or below it, or attached to a commercial activity
- *townhouses, flats, units and other housing* - the rest of the multi-unit dwellings, including side-by-side type units, such as terraced housing.

The multi-unit dwelling type numbers vary significantly from year to year, particularly apartments.

Table 3-1 National consented dwellings, by type (2014-2015)

Type	2014 #	2015 #	2014-15 %
Detached	18,359	19,038	72
Retirement village units	1,917	1,899	7
Townhouses, flats, units, other dwellings	2,720	3,656	12
Apartments	1,721	2,539	8
Total	**24,717**	**27,132**	**100**

Figure 3-4 Multi-unit dwellings consented nationally, by dwelling type (1991-2015)

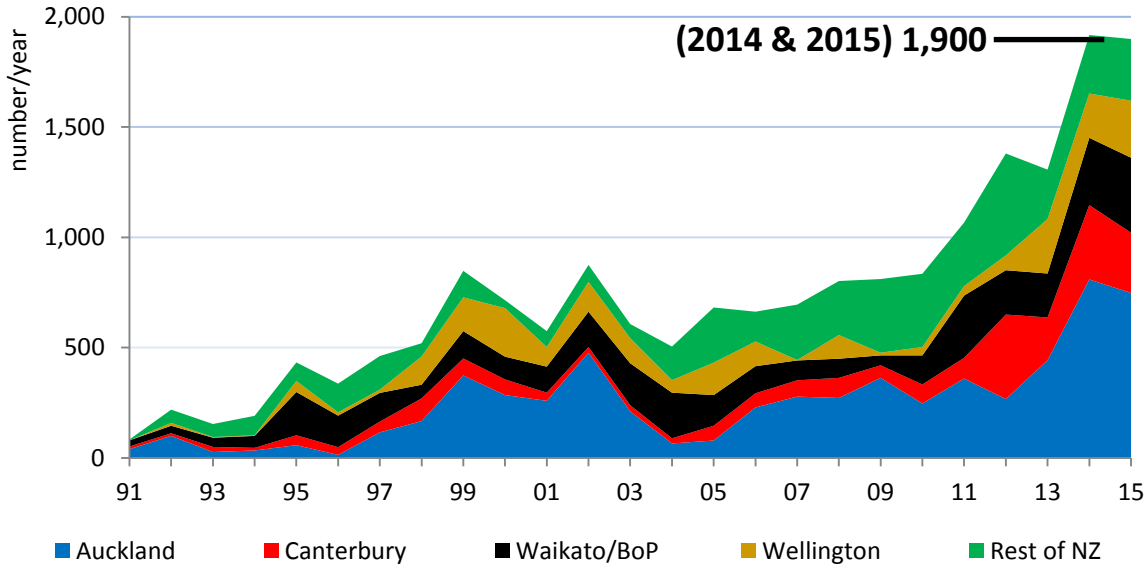


Source: Statistics NZ

National retirement village unit history

Auckland, Canterbury, Waikato / Bay of Plenty and Wellington, all had record high levels of retirement unit consents in 2014, followed by similar levels in 2015. Canterbury has a lower percentage of retirement village units to dwelling units than the other regions. In both 2014 and 2015 highs of about 1,900 retirement village units were consented nationally; these include all units in retirement villages from detached houses to apartments and units.

Figure 3-5 Retirement village units consented nationally (1991-2015)



Source: Statistics NZ

National apartment history

Apartment building requires a large amount of capital investment, with most projects relying on off-the-plan purchases. The larger number of units and longer build time per consent compared to stand-alone houses can explain some of the big changes from year to year in the numbers.

Auckland (18%) and Wellington (12%) are the only regions with ratios of apartments above the national ratio of all dwelling units (8%). Auckland apartments represent 72% of all apartments consented nationally for 2014-2015.

Table 3-2 Apartment numbers consented, by region (2014-2015)

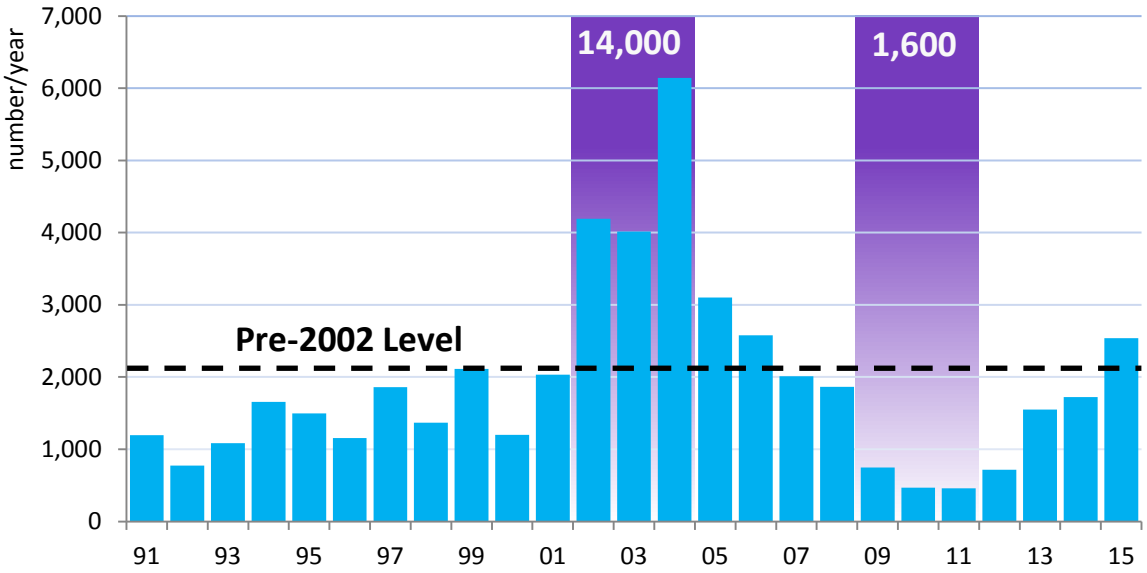
Region	2014	2015	(2014-2015)	% [3]
Auckland	1,144	1,919	3,063	72
Wellington	171	216	387	9
Canterbury	159	125	284	7
Waikato / Bay of Plenty	181	187	368	9
Rest of New Zealand	66	92	158	5
National	**1,721**	**2,539**	**4,260**	**100**

Source: Statistics NZ

[3] Apartment consents for the region as a percent of the national total.

The apartment numbers vary significantly from year to year, doubling in 2002 and halving in 2005. More than 14,000 apartments were consented nationally in the years 2002-2004, followed by a decrease to 1,600 in years 2010-2012. Apartment activity has increased again since 2012, to above pre-2002 maximum levels, in 2015.

Figure 3-6 Apartments consented nationally (1991-2015)

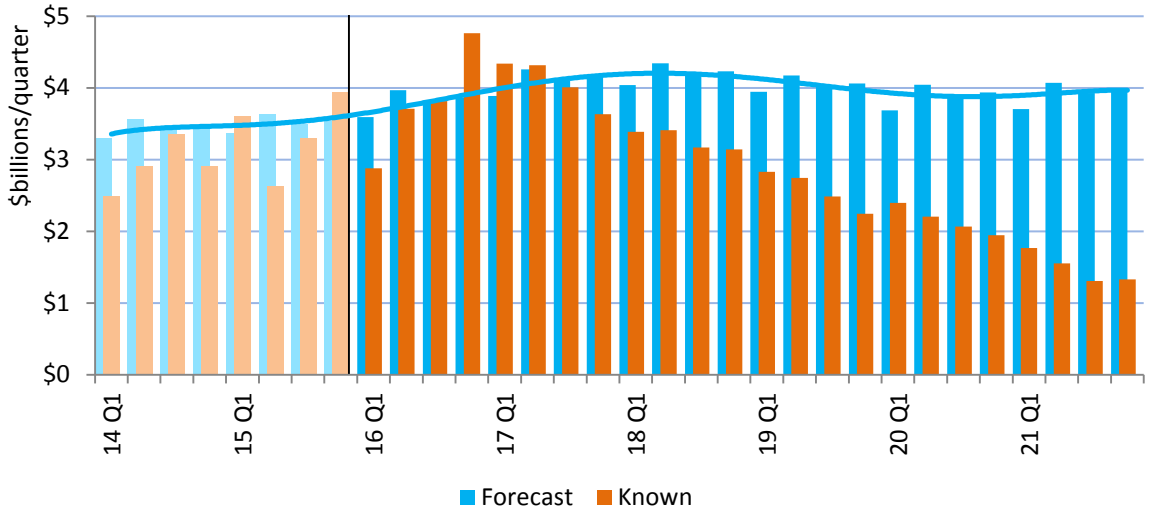


Source: Statistics NZ

3.4 All national non-residential construction

The value of *all non-residential construction*[4] is forecast to increase by 20% over 2016 - 2018 to a peak of $16.8b at the end of 2018. The annual value is projected to remain above current elevated levels of about $16b per year for the duration of the forecast period. A higher than typical peak in the Pacifecon known project intentions is evident around 2016 Q4, indicating a large volume of non-residential building and other construction is planned to commence at this time.

Figure 3-7 All non-residential construction nationally



Source: BRANZ / Pacifecon

The following types of national, non-residential projects are financially significant over the next six years:

- transport projects, eg roads of national significance
- Canterbury rebuild and earthquake strengthening
- mixed use developments (with mixtures of residential, retail, office and parking)
- water/wastewater projects, and
- industrial developments, eg milk processing and timber plants.

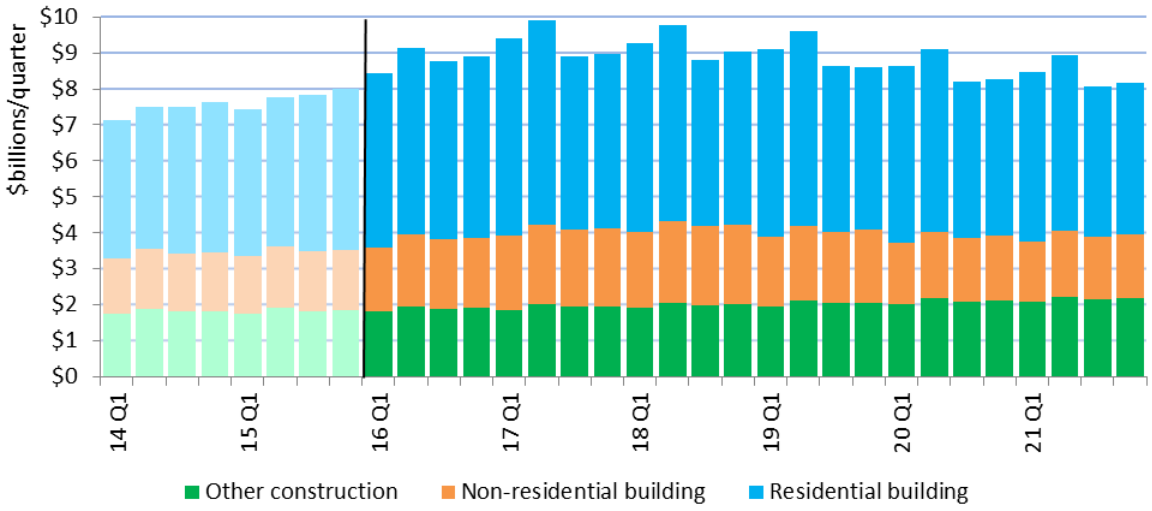
Source: Pacifecon

[4] All non-residential construction: the combination of both *non-residential building* and *other construction* as defined in Appendix B

3.5 Building and construction by activity type

The value of residential building is higher and more variable across all quarters than either non-residential building or other construction. The value of residential building is forecast to peak in 2017 and non-residential building in 2018, while other construction gradually increases throughout the forecast period.

Figure 3-8 All construction nationally, by activity type



Source: BRANZ / Pacifecon

3.6 Other construction

Other construction[5] represents about a quarter of all building and construction by value for 2016 (see figure 3-6). It includes all construction that is not a building, including:

- Infrastructure projects
- mining, and
- power projects (wind, thermal, hydro).

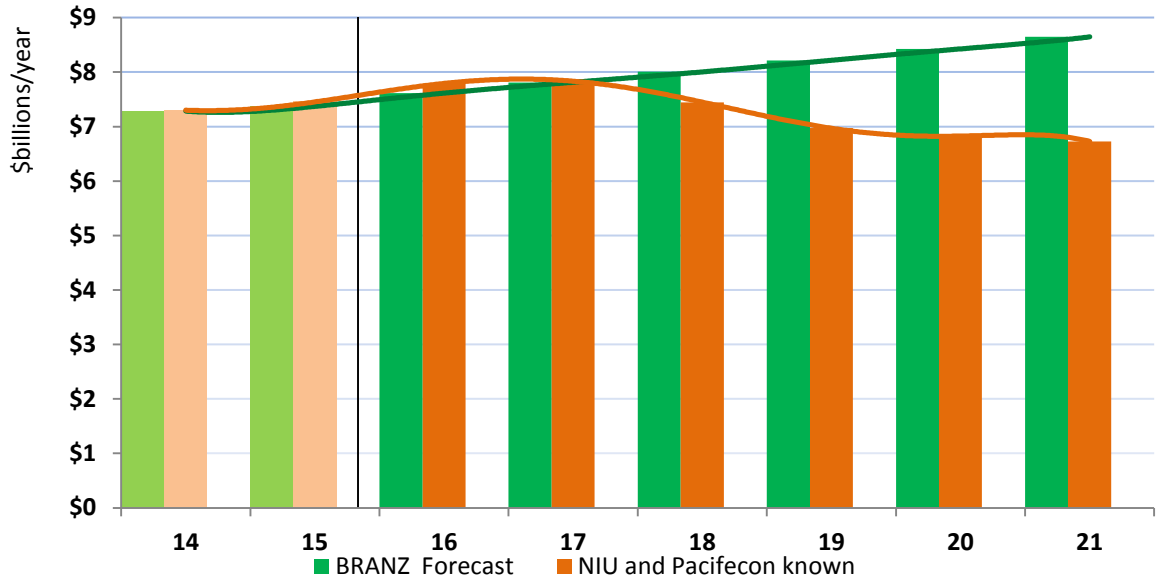
Local government initiates about half of other construction, central government a fifth and the rest is funded by the private sector.

For forecasting other construction we use Pacifecon's database of known intentions, complemented by the *National Infrastructure Unit's* (NIU) evidence base, to add richness to the BRANZ Forecast. The updated methodology used for the 2015 report has proved to be reasonably accurate so no major adjustments have been made for this year's report.

Other construction grew by 1.1% in 2015. BRANZ forecasts that this growth will continue at about 2.5% per year throughout the forecast period. The NIU and Pacifecon combined data series also note moderate growth through to 2017.

5 Other construction: horizontal structures (often civil works) including: roads, bridges, tunnels, reservoirs, street lighting, cabling for electricity and telecommunication, runways, harbours, marinas, dredging/flood control, outlets to the sea, subdivisions, earthmoving, landscaping, parks, agriculture, demolitions, transport and car park buildings, bus stops, pipe laying for water supply and wastewater plus gas pipes, refuse and landfill.

Figure 3-9 Comparison of BRANZ forecast for other construction with NIU and Pacifecon data



Source: BRANZ / Pacifecon / NIU

3.7 Comparing Pacifecon known projects with the National Infrastructure Unit's evidence base[6]

The NIU's data includes central and local government's best view of future infrastructure spending at the time, which is often subject to a variety of approval requirements. Once an intention is more clearly defined it is likely to be included in Pacifecon's known project data set.

The NIU published an update of its evidence base in March 2015, but it has moved its annual reporting date from March to October for the 2016 year. Due to the change in timing of the NIU reporting it was not possible to include new data in this year's pipeline report. We will incorporate the data available from the NIU due later this year into next year's National Construction Pipeline Report. We have included the March 2015 evidence base again in this year's report as the best available data at the time for public sector intentions.

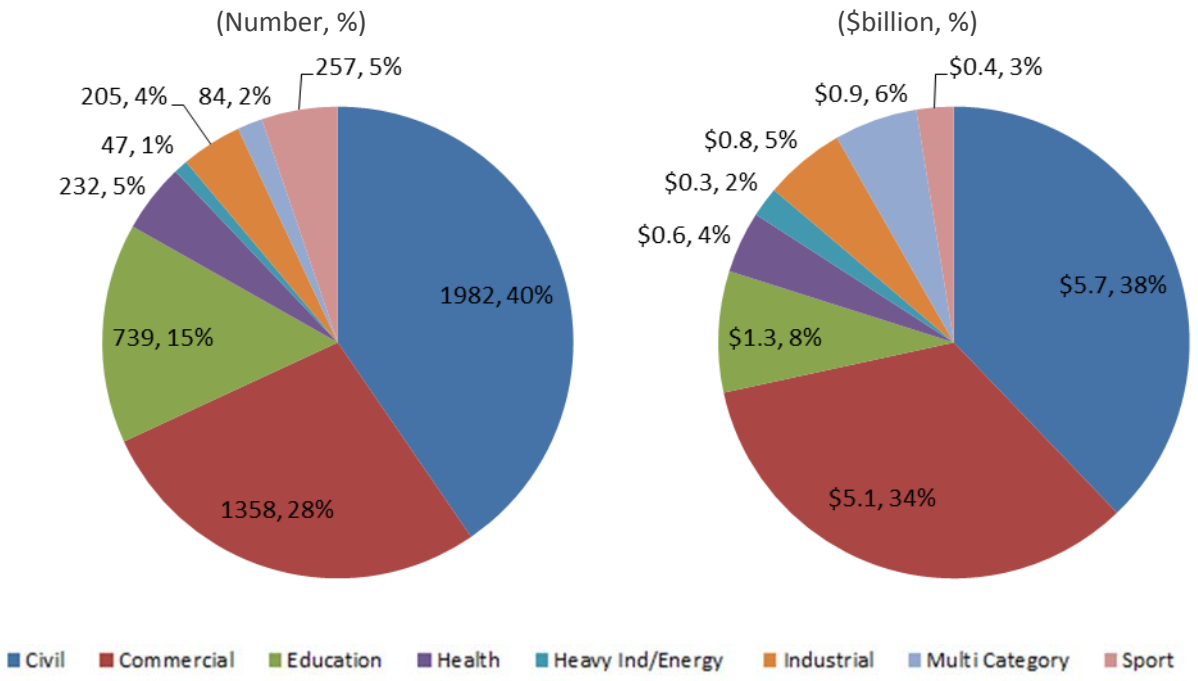
6 Inclusion of a project does not mean that it has been funded, approved, or will proceed, or that if it does proceed it will be to the scale and timeframe indicated in this report. It is however, the best available picture at this particular point in time.

3.8 Types of projects for all non-residential construction

Civil and commercial projects dominate all non-residential construction anticipated to start in the year to December 2016 (72% by value). The share of projects by number and value are about the same. For example, health projects represent 5% of all projects by number and 4% of the total value of work anticipated to start in the year to December 2016. The exceptions are:

- education and sport, where there are many projects (20% by number) with a lower value (11%), and
- commercial projects have fewer projects (28% by number) with a greater value (34%).

Figure 3-10 All non-residential construction projects anticipated to start in the year to December 2016, by number of projects, value and type



Source: Pacifecon

3.9 Value of work distribution for all non-residential construction

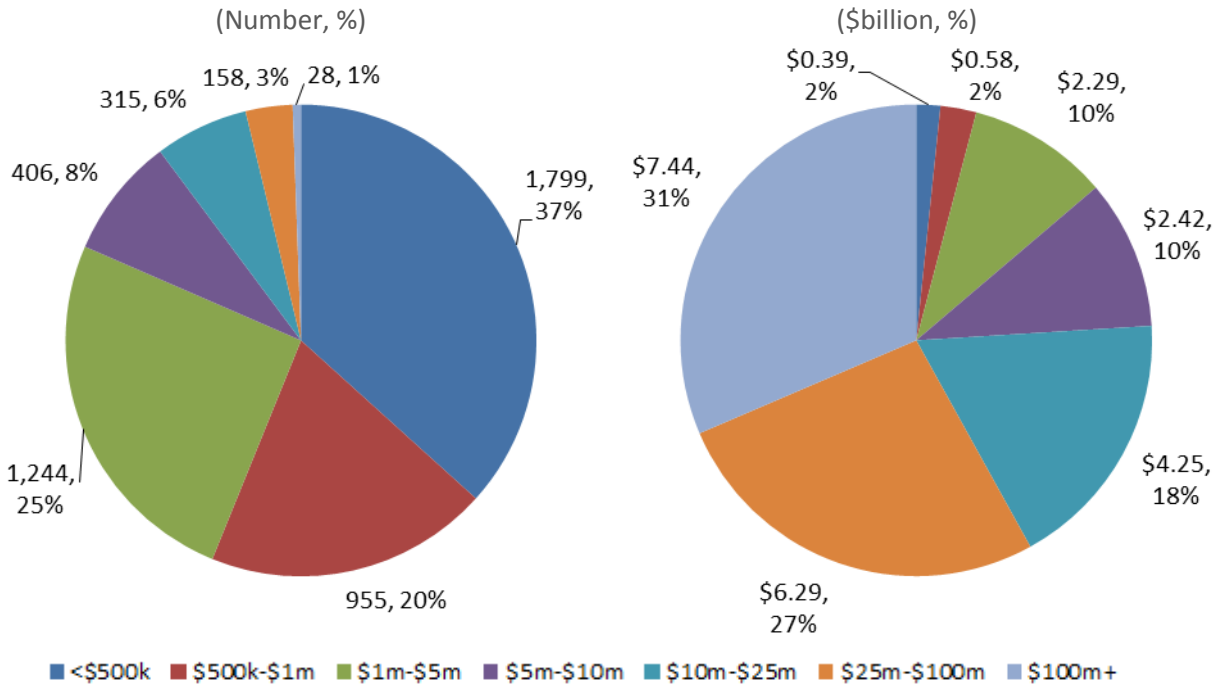
A relatively small number of projects account for most of the value of all non-residential construction – this is consistent with findings in the previous reports. More than 4,900 known projects are anticipated to start between January and December 2016, 56% of these projects have an estimated value of less than $1 million, and 82% less than $5 million.

There are 186 projects valued at $25 million and over which are anticipated to start in the year to December 2016, accounting for 58% by value. There are 28 projects valued at $100 million and over, accounting for 31% by value[7].

In contrast, most residential projects are under $1million, and in total, residential building represented 55% of the total national value of work for 2015.

7 See Appendix D for a list of projects with a value of about $100 million and over, likely to start in the year to December 2016.

Figure 3-11 Value bands of all non-residential construction projects anticipated to start in the year to December 2016, by number of projects, and by value



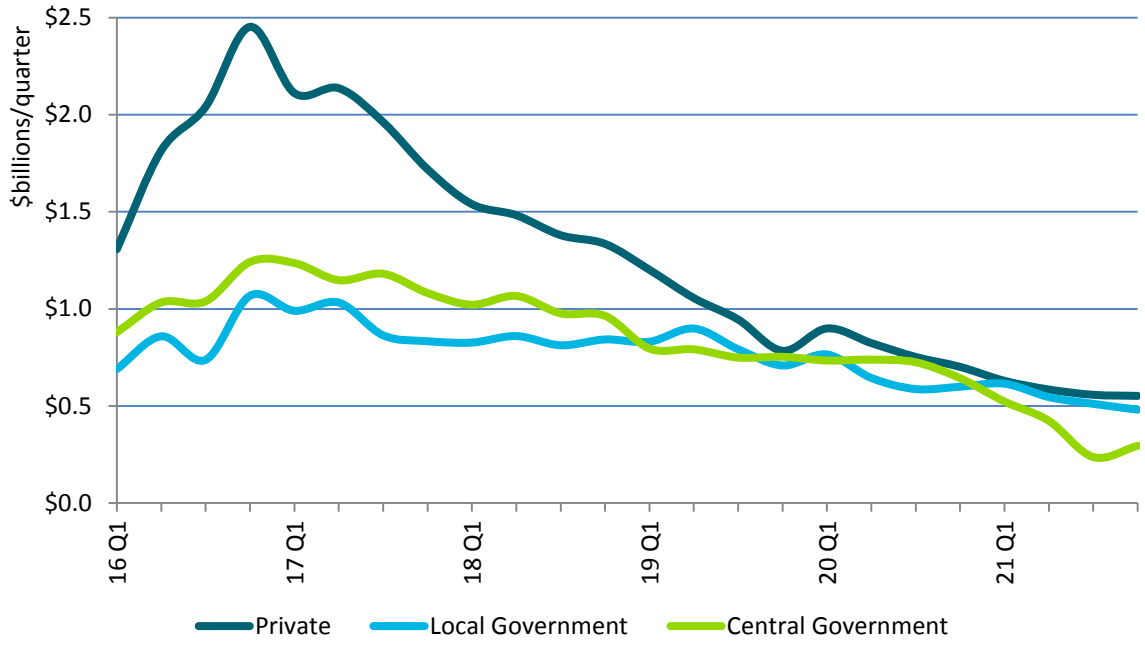
Source: Pacifecon

3.10 Project initiators for all non-residential construction by sector

The peak in privately initiated project intentions in the fourth quarter of 2016 is typical of the optimism bias, where the construction intentions are typically over-estimated in the first year of the known projects data - see Section 5.4 for a full description of optimism bias.

Projects initiated by local and central government increase their share of the total over time. Large public projects tend to have greater visibility and firmer start dates, due to the requirements for public consultation and notification, than privately funded large projects.

Figure 3-12 Value of all known non-residential construction projects, by sector and start date



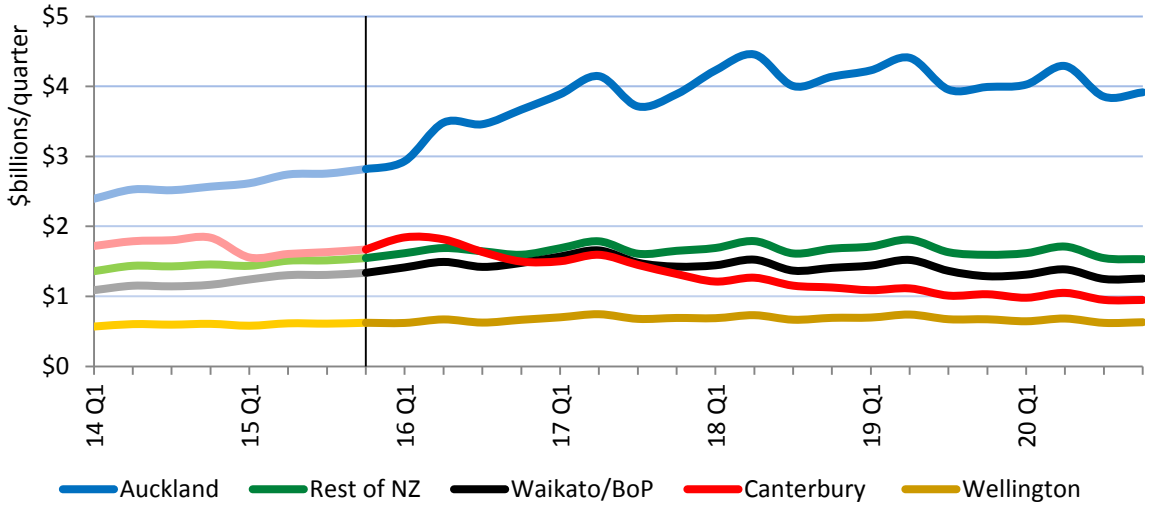
Source: Pacifecon

3.11 Regional comparisons

This section considers the differences in all projected residential building and all non-residential construction across the regions. The regions are discussed individually in Section 4.

Auckland has seen 9% growth in value in 2015 and 54% more is expected with a peak in 2018. Auckland dominates the national demand for all building and construction, even with the impact of the Canterbury rebuild. Notably the Waikato / Bay of Plenty region has seen 15% growth in value over 2015 and 24% more is forecast to the 2017 Q2 peak.

Figure 3-13 Value of all building and construction by region



Source: BRANZ / Pacifecon

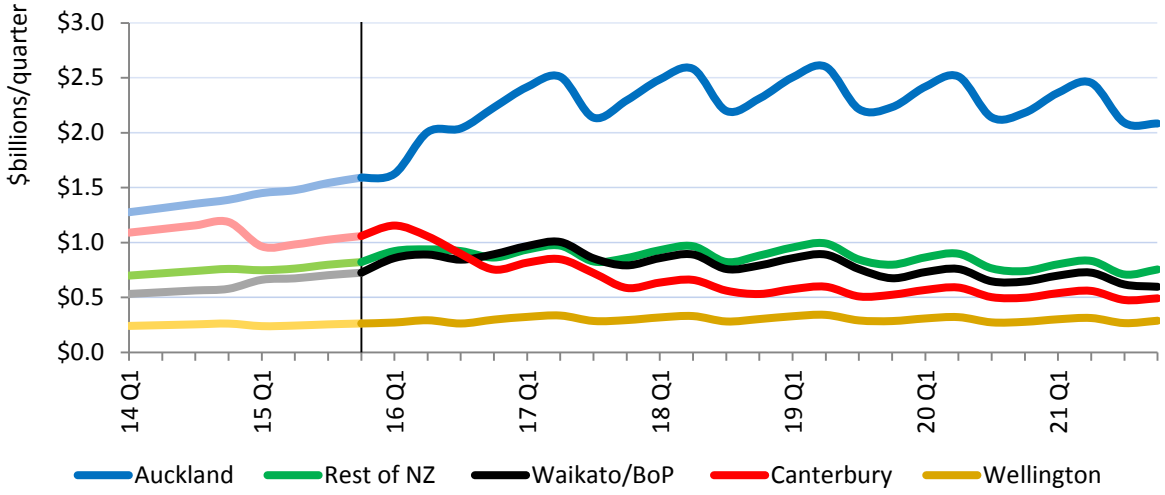
Residential building regional comparison

National growth in residential building is driven by the continued rapid growth of Auckland's activity, with 14% growth seen in 2015 and 58% more is forecast to a peak in 2018.

The Waikato / Bay of Plenty region saw 25% of growth in residential activity in 2015 and 31% more is forecast to a peak in 2017.

Canterbury's residential activity remains elevated near the peak levels of the past few years, with steadily decreasing residential activity forecast from 2016 to the end of the forecast period as the bulk of the residential rebuild is completed.

Figure 3-14 Value of residential building by region



Source: BRANZ

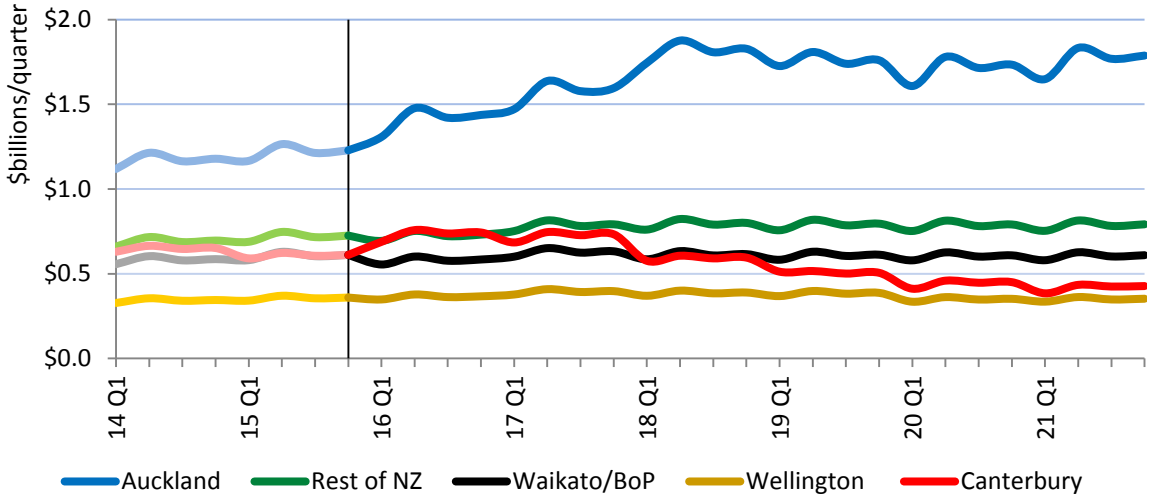
All non-residential construction regional comparison

Auckland is the standout performer with all non-residential construction expected to grow steadily to an elevated plateau in 2018 due to a number of major projects coming on stream.

The value of all non-residential construction in Canterbury is projected to increase to a peak of $2.9b in 2016, before declining below all other regions, except Wellington, by 2021.

We expect all other regions to remain at stable levels throughout the forecast period.

Figure 3-15 Value of all non-residential construction by region



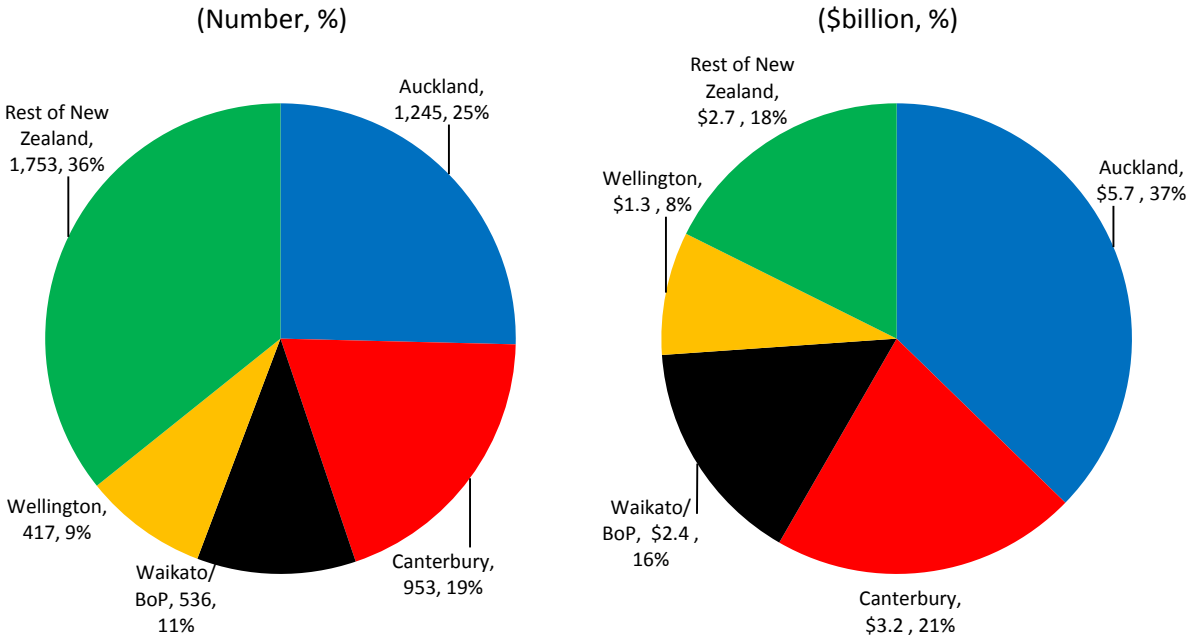
Source: BRANZ / Pacifecon

Auckland, Canterbury and Waikato / Bay of Plenty dominate all known non-residential construction intentions in the year to December 2016, with 55% of work by number of projects and 74% by value. Projects in the Rest of New Zealand have at least 50% lower average project values.

Table 3-3 All non-residential construction projects, by region

Region	Value (%)	Number (%)	Average project value
Auckland	37	25	$4.5 m
Waikato/BoP	16	11	$4.4 m
Canterbury	21	19	$3.3 m
Wellington	8	9	$3.1 m
Rest of New Zealand	18	36	$1.5 m
All of New Zealand	**$15.2b total**	**4,904 projects**	**$3.1 million average**

Figure 3-16 Number and value of all known non-residential projects anticipated to start in the year to December 2016, by region



Source: Pacifecon

4 Regional forecast

In this section we discuss the four main regions in greater detail, with aggregated data provided for the rest of New Zealand:

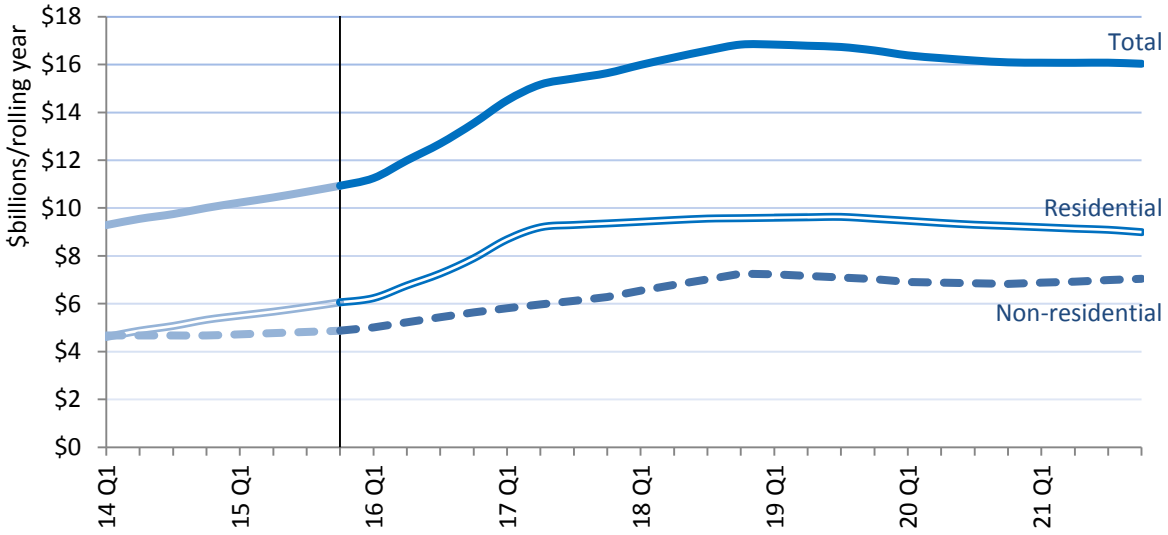
Auckland
Canterbury
Waikato / Bay of Plenty
Wellington, and
Rest of New Zealand (some detail about individual regions is given).

4.1 Auckland[8]

Auckland dominates the national demand for building and construction, by accounting for over a third of the forecast value of all building and construction from 2015 to the end 2021. The total value of activity in Auckland increased 9% in 2015. This increase in value is forecast to continue and peak in 2018 around $17b and to remain above $16b per year for the remainder of the forecast period.

Residential construction in 2015 contributed the most significant portion of the growth at 14%, compared to 4% growth for all non-residential construction. Residential building is forecast to increase sharply by 58% to 2018. All non-residential construction is also forecast to increase sharply by 49% to 2018.

Figure 4-1 All construction in Auckland, by value



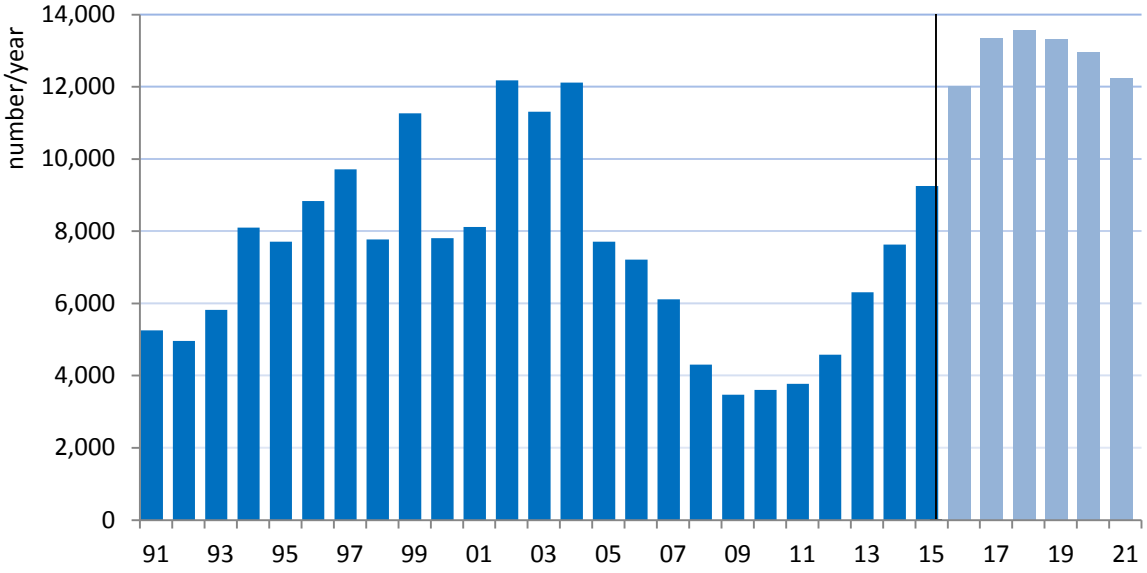
Source: BRANZ / Pacifecon

8 The area covered by Auckland Council.

Auckland dwelling consents

Auckland dwelling consents are expected to exceed the 2002 peak, from 2017 to the end of the forecast period.

Figure 4-2 Dwelling units consented in Auckland

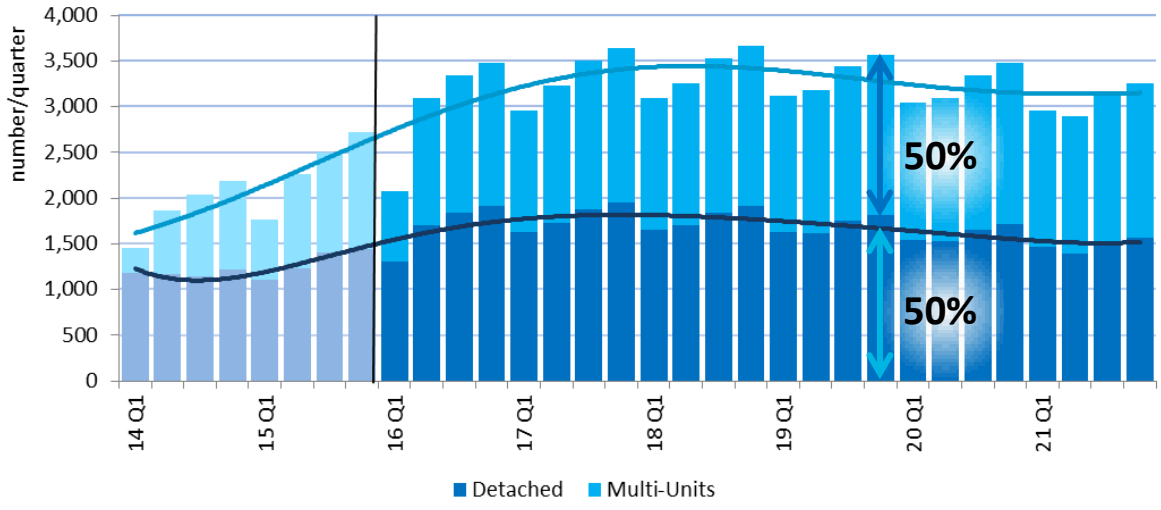


Source: Statistics NZ / BRANZ

The report forecasts 94,200 new dwelling consents in Auckland between January 2014 and December 2021. Almost the same number as forecast in the 2015 report for an equivalent period[9].

Auckland was the region with the highest ratio (44%) of multi-unit dwelling consented for 2015 with half of all consents forecast to be multi-unit by 2020. Over 50,000 detached dwelling consents are projected for Auckland from 2014 through 2021 and over 44,000 consents for multi-unit dwellings in the same period.

Figure 4-3 Dwelling units consented in Auckland



9 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.

Source: BRANZ

Auckland's dwelling type history[10]

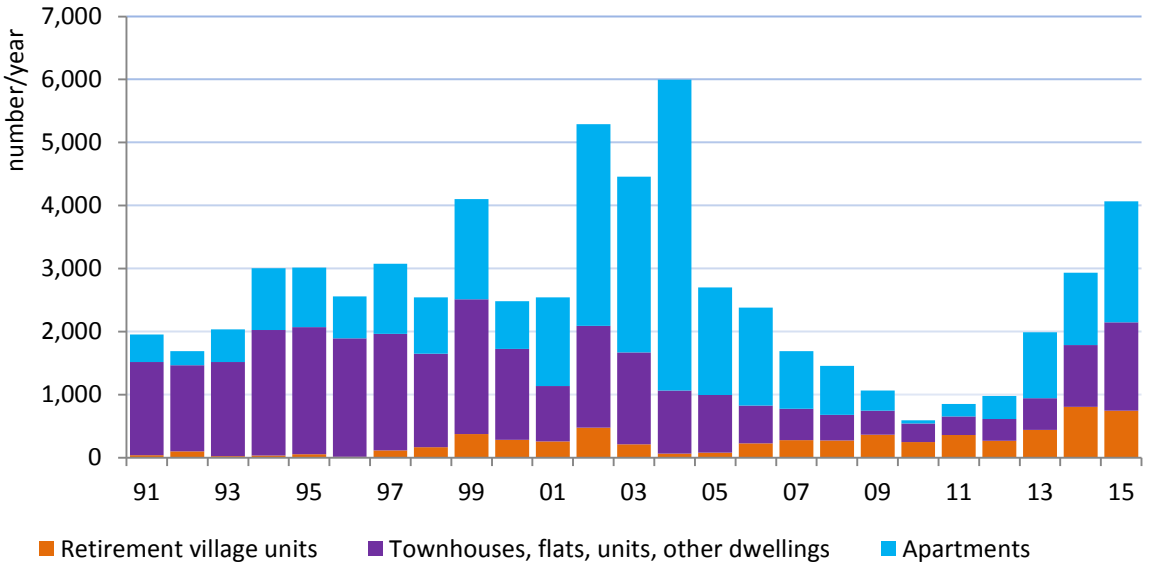
The different types of dwellings all show levels of variability in the historic consent data:

- apartments are the most variable with a high of 4,900 in 2004 and a low of 50 in 2010, a 99% difference,
- retirement village units with a high of 750 in 2015 and a low of 66 in 2004, a 91% difference,
- Townhouses were the least variable with a high of 2,100 in 1999 and a low of 300 each in 2010 and 2011, an 86% difference, and
- detached house consents by comparison are less variable with a high of 7,200 in 1999 and a low of 2,400 in 2009, a 66% difference.

Table 4-1 Auckland consented dwellings, by type (2014-2015)

Type	2014 (#)	2015 (#)	2014-2015 (%)
Detached	4,699	5,185	59
Retirement village units	809	748	9
Townhouses, flats, units, other dwellings	980	1,399	14
Apartments	1,144	1,919[11]	18
Total	**7,632**	**9,251**	**100**

Figure 4-4 Multi-unit dwellings consented in Auckland, by dwelling type (1991-2015)



Source: Statistics NZ

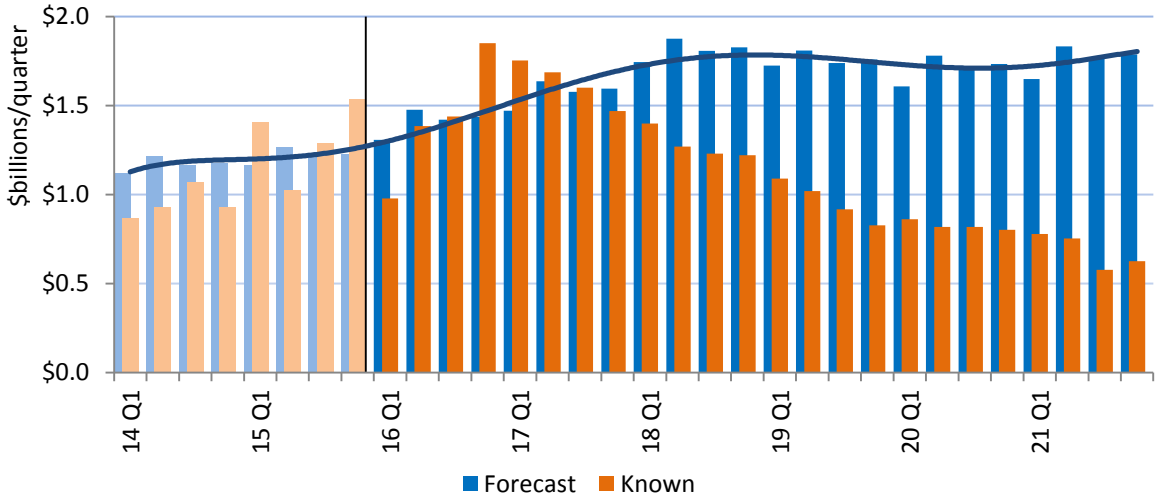
10 Statistics NZ groups multi-unit dwelling consent data into three sub categories: retirement village units; apartments; and townhouses (terraced housing), flats, units and other housing. See Section 3.3 for a more detailed explanation.

11 Correction in Table 4-1, October 2016. Revised from 1,144 to 1,919 apartments consented in Auckland in 2015, also revised total for 2015 from 8,476 to 9,251 dwellings consented in Auckland for 2015. Numbers revised to correct error and make consistent with Figure 4-4.

Auckland non-residential construction

All non-residential construction grew 4% over 2015 and is projected to steadily increase by 49% to $7.3b in 2018 due to a number of major projects planned for the Auckland region. There is a higher than typical peak in the value of known project intentions in the Pacifecon dataset for Auckland around 2016 Q4, indicating a large volume of non-residential building and other construction is planned to commence at this time.

Figure 4-5 All non-residential construction for Auckland



Source: Pacifecon / BRANZ

Planned work in Auckland includes:

- new residential builds: Special Housing Areas[12] and all other types of privately initiated building, including apartments (particularly in the central city)
- civil work, e.g. roads, rail and interchanges for bus/train, residential subdivisions, water, wastewater, storm water
- retirement villages (new and expanded) and student accommodation
- new town centres and improvements to older suburbs
- 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.

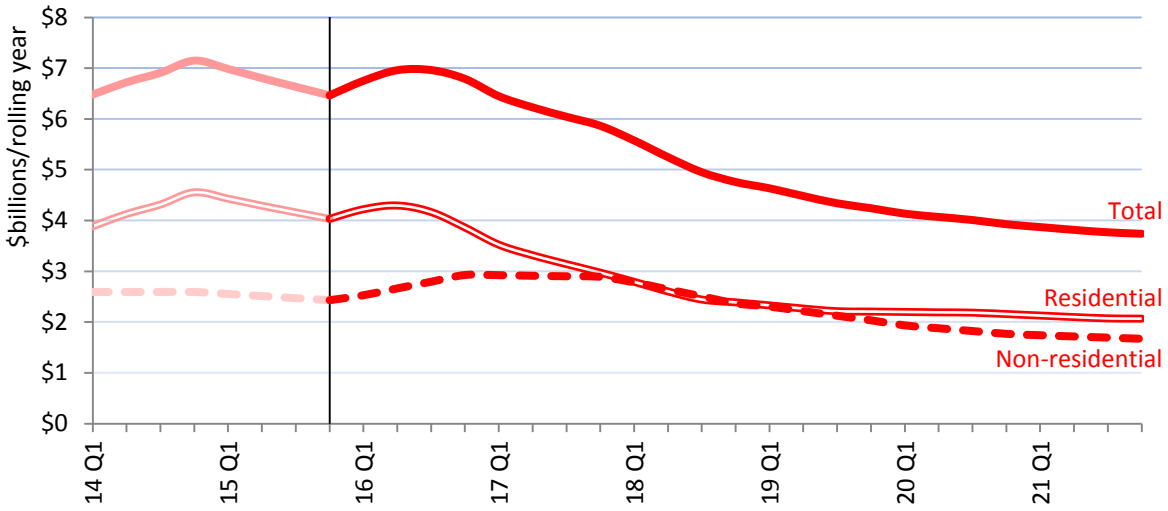
Source: Pacifecon

12 Special Housing Areas (SHAs) are areas recommended by local government and approved by central government in districts that have significant 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).

4.2 Canterbury[13]

Building and construction activity levels in Canterbury have fluctuated a little following the peak in 2014 Q4. This is a result of residential consent levels dropping off sharply in the first half of 2015 then rising again slightly during the second half of 2015. This has resulted in the bump in residential building value projected for 2016, with a slow decrease expected for the rest of the forecast. Non-residential activity has gained momentum over the past few years and is expected to peak in value at the end of 2016, before slowly decreasing to the end of the forecast.

Figure 4-6 All construction in Canterbury, by value



Source: BRANZ / Pacifecon

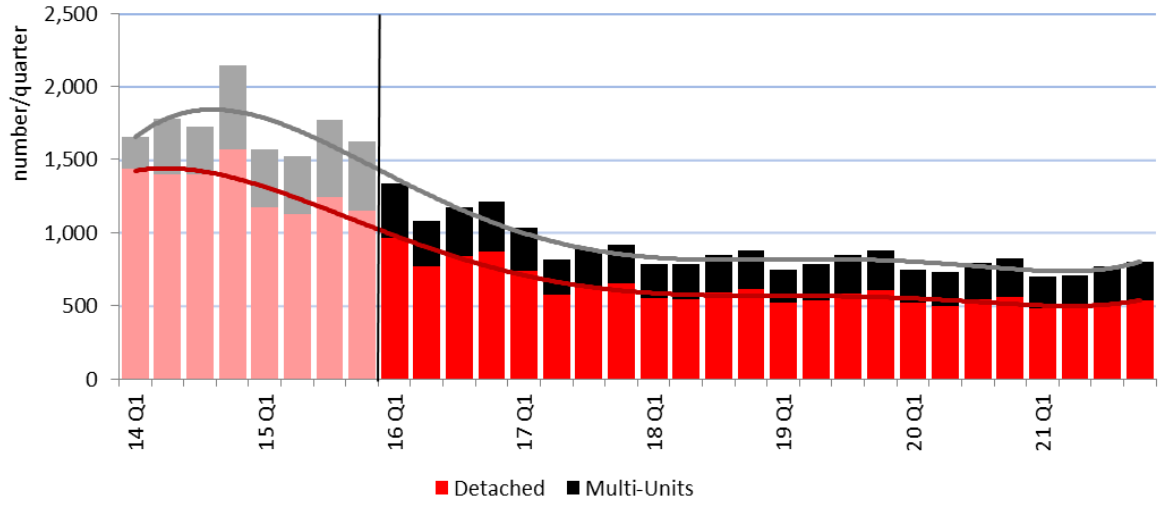
Canterbury dwelling consents

The forecast for consents has come off the peak of 2014 and is likely to decline over 2016/17. While we expect the number of residential consents to decline to about 50% of 2015 levels by 2018, the value of residential building is forecast to remain at 2015 levels until mid-2016 and reduce more slowly, reaching half of the 2015 levels by 2019.

13,800 dwellings were consented during 2014 and 2015, and another 14,000 detached house and 6,000 multi-unit dwelling consents are forecast for Canterbury to the end of December 2021. Multi-unit dwelling consents represent more than one in every four (28%) consented dwellings in 2015 and close to one in every three (32%) by the end of the forecast period.

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

Figure 4-7 Dwelling units consented in Canterbury



Source: BRANZ

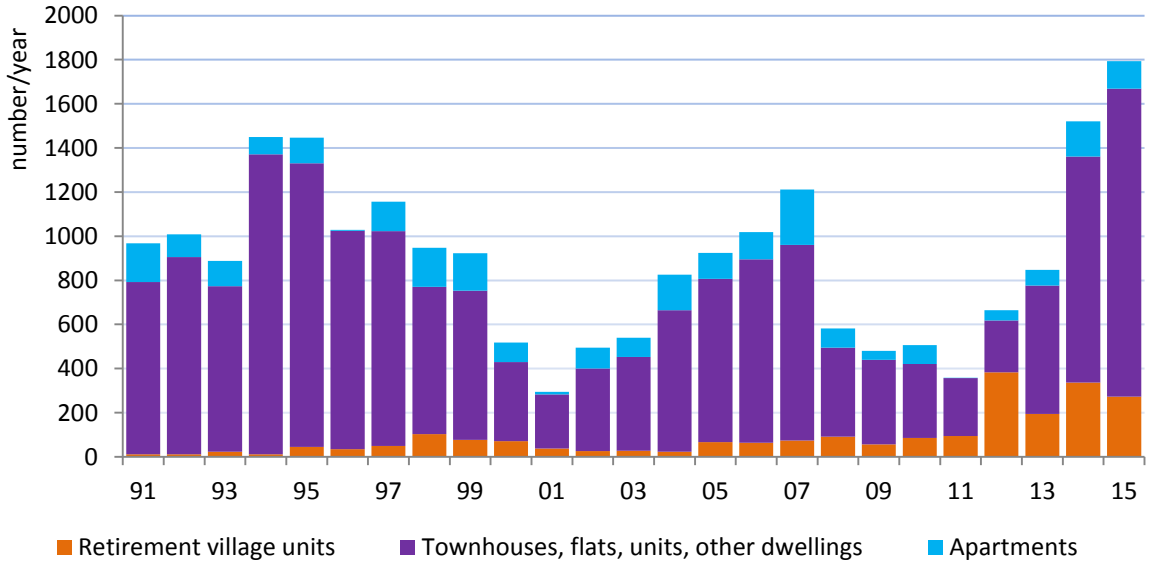
Canterbury dwelling type history

Canterbury has a lower percentage of medium density dwellings than Auckland and Wellington. The retirement category is also somewhat low compared to 7% nationally for 2014 - 2015.

Table 4-2 Canterbury consented dwellings, by type (2014-2015)

Type	2014 (#)	2015 (#)	2014-2015 (%)
Detached	5,788	4,696	76
Retirement village units	337	273	4
Townhouses, flats, units, other dwellings	1,024	1,395	18
Apartments	159	125	2
Total	**7,308**	**6,489**	**100**

Figure 4-8 Multi-unit dwellings consented in Canterbury, by dwelling type (1991-2015)

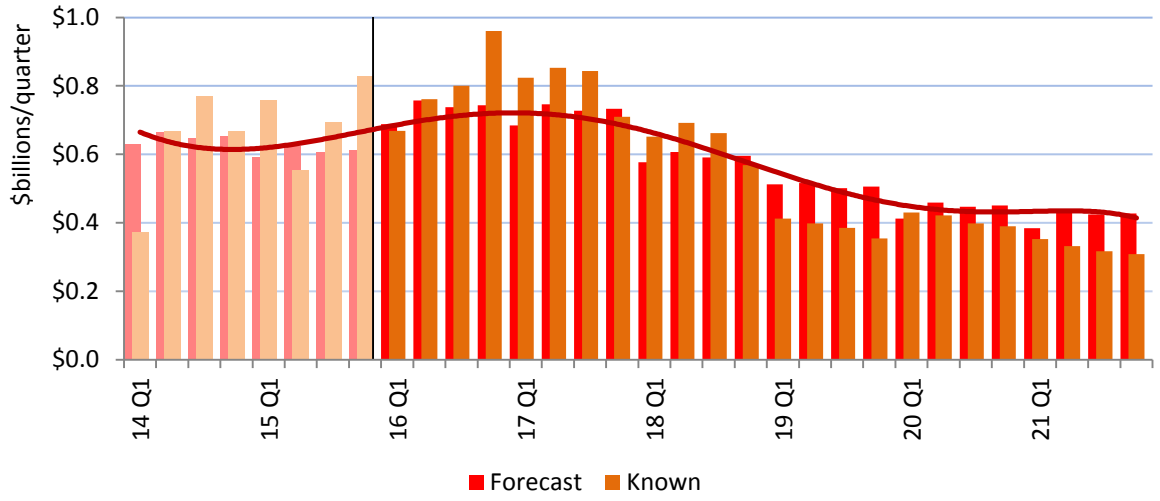


Source: Statistics NZ

Canterbury non-residential construction

All non-residential construction is forecast to increase to $2.9b per year in 2016/2017 and remain above $2.4b until 2019, before steadily reducing to around $1.7b in 2021. A higher than typical peak in the Pacifecon known project intentions is evident around 2016 Q4, indicating a large volume of non-residential building and other construction is planned to commence at this time.

Figure 4-9 All non-residential construction for Canterbury



Source: Pacifecon / BRANZ

Planned work in Canterbury includes:

- housing repairs, rebuilds and new builds (including on TC3[14] land and hill sites)
- civil projects, motorways, suburban roads, port, landscaping and streetscaping
- 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, and
- rural activities, eg milk processing plants and irrigation works.

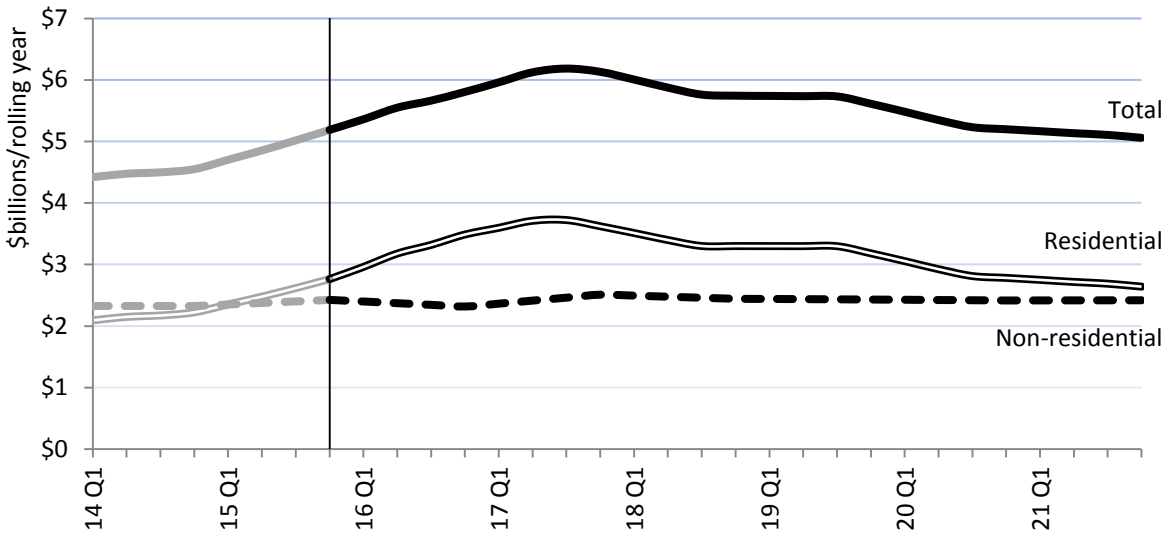
Source: Pacifecon

14 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.

4.3 Waikato / Bay of Plenty[15]

2015 was a year of intense growth for the Waikato and Bay of Plenty regions with an increase of 24% in residential building by value. Last year's report expected the total value of all building to peak in 2018 ($5.6b), but this revised forecast is now higher and sooner[16] with a peak in 2017 ($6.1b). Waikato and the Bay of Plenty form the third largest region by value of work, and are expected to become the second largest by the 2017 report. The residential activity is forecast to remain elevated above 2015 levels to the end of 2020.

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



Source: BRANZ / Pacifecon

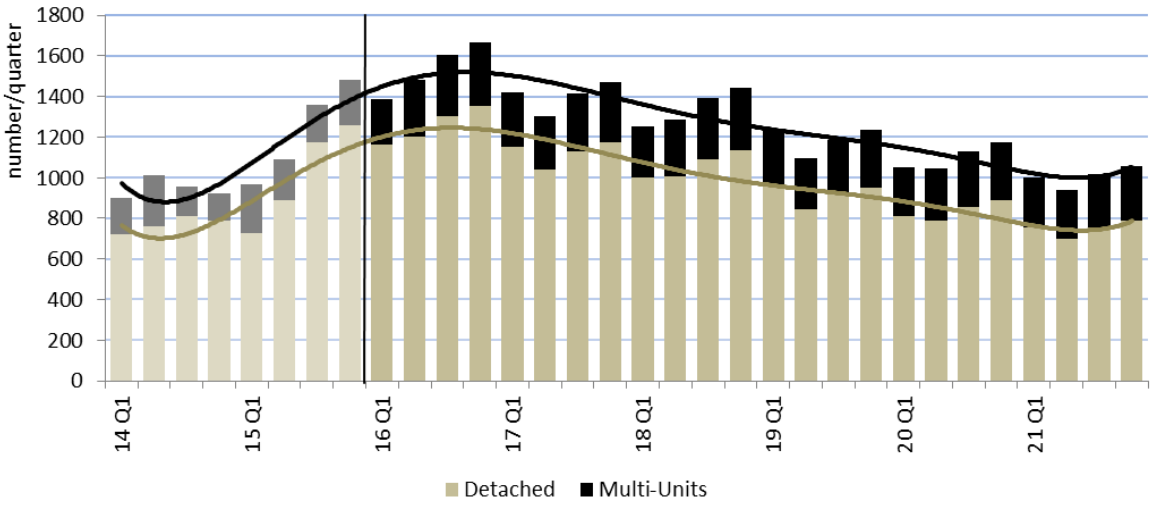
Waikato / Bay of Plenty dwelling consents

The forecast includes 39,000 new dwelling consents in Waikato / Bay of Plenty between January 2014 and December 2021. Multi-unit dwelling consents representing one in every six (18%) consented dwellings in 2015 and one in every four (25%) by the end of the forecast period.

15 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.

16 A peak of $5.6b total value of all construction in 2018 was previously forecast for Waikato / Bay of Plenty in the 2015 National Construction Pipeline Report.

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



Source: BRANZ / Pacifecon

Waikato and the Bay of Plenty dwelling consent comparisons

Due to the current growth in these regions this report includes a look at dwelling consents for Waikato[17] and the Bay of Plenty[18] separately. Both regions have had strong growth over 2015 with 26% for Waikato and 35% for the Bay of Plenty. The Waikato region represents 61%, and the Bay of Plenty 39% of the total number of consents for the Waikato / Bay of Plenty region for 2015. Both regions are below the national ratio (30%) of multi-unit dwelling consents with 19% for Waikato and 15% for the Bay of Plenty. Multi-unit dwellings are forecast to represent one in every three (29%) for Waikato and one in every five (22%) for the Bay of Plenty by the end of the forecast period.

Waikato dwelling type history[19]

Table 4-3 Waikato consented dwellings, by type (2014-2015)

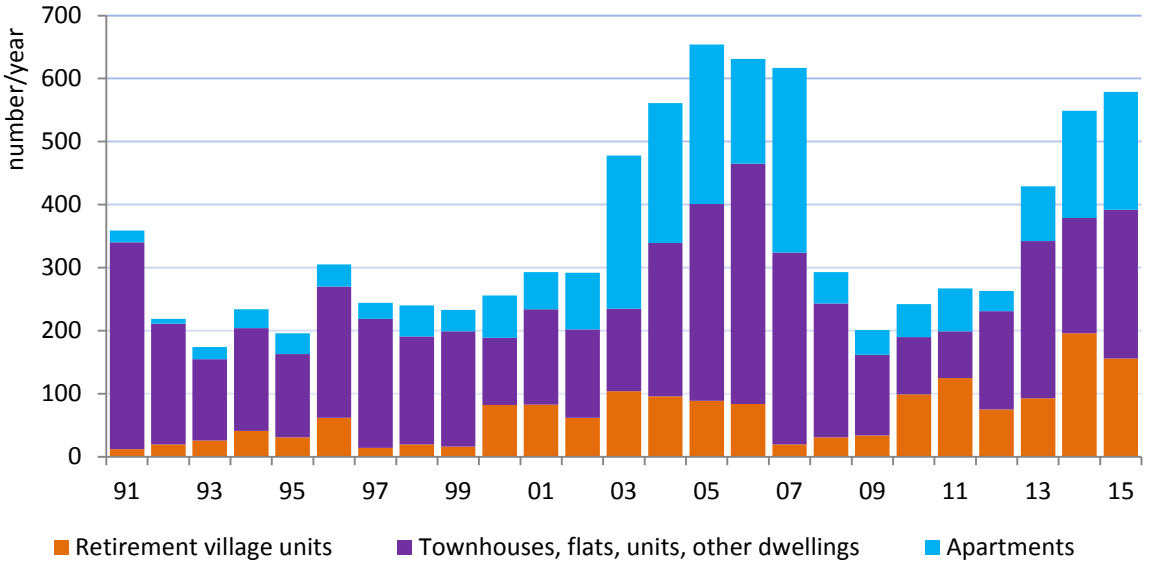
Type	2014 (#)	2015 (#)	2014-2015 (%)
Detached	1,820	2,421	79
Retirement village units	196	156	7
Townhouses, flats, units, other dwellings	183	236	8
Apartments	170	187	7
Total	**2,369**	**3,000**	**100**

17 Waikato region in this report includes Hamilton City, Taupo/Turangi, Taupo/Mangakino, Waikato, Waipa, Otorohanga, Waitomo, Thames-Coromandel, Hauraki, Matamata-Piako and South Waikato Districts.

18 Bay of Plenty region in this report includes Tauranga, Western Bay of Plenty, Rotorua, Kawerau, Whakatane, Opotiki, Taupo District.

19 Statistics NZ groups multi-unit dwelling consent data into three sub categories: retirement village units; apartments; and townhouses (terraced housing), flats, units and other housing. See Section 3.3 for a more detailed explanation.

Figure 4-12 Multi-unit dwellings consented in Waikato, by dwelling type (1991-2015)



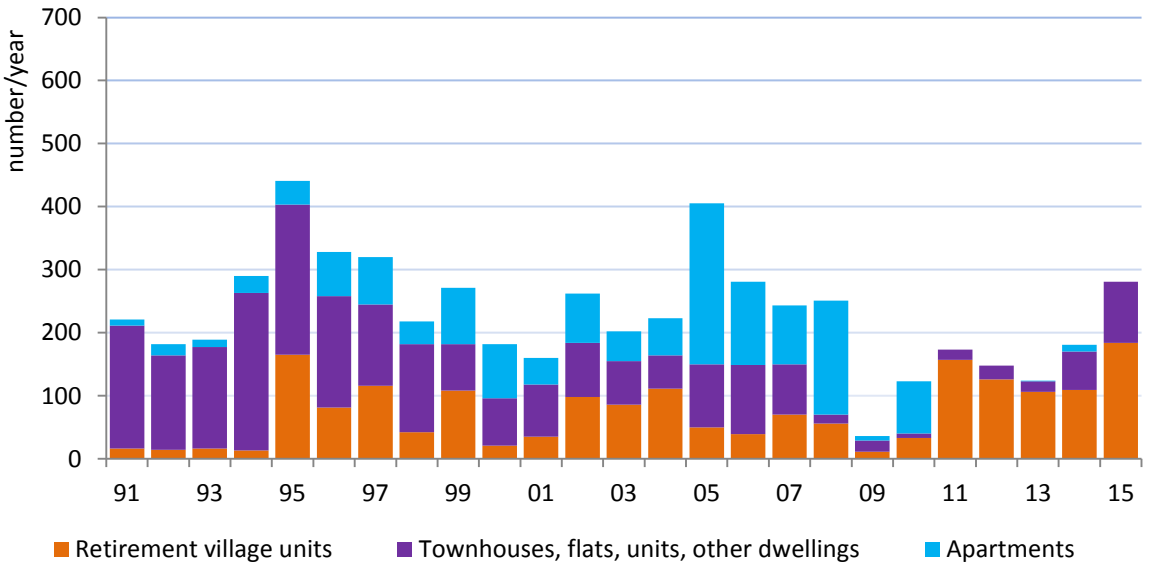
Source: Statistics NZ

Bay of Plenty dwelling type history[20]

Table 4-4 Bay of Plenty consented dwellings, by type (2014-2015)

Type	2014 (#)	2015 (#)	2014-2015 (%)
Detached	1,231	1,620	86
Retirement village units	109	184	9
Townhouses, flats, units, other dwellings	61	97	5
Apartments	11	0	0
Total	**1,412**	**1,901**	**100**

Figure 4-13 Multi-unit dwellings consented in the Bay of Plenty, by dwelling type (1991-2015)



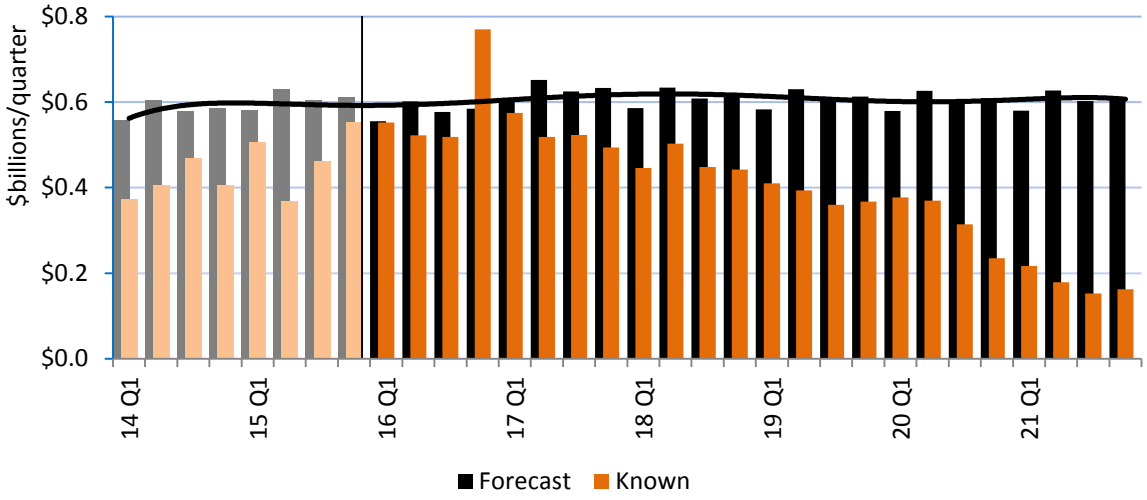
Source: Statistics NZ

20 Statistics NZ groups multi-unit dwelling consent data into three sub categories: retirement village units; apartments; and townhouses (terraced housing), flats, units and other housing. See Section 3.3 for a more detailed explanation.

All Waikato / Bay of Plenty non-residential construction

The steady growth in all non-residential construction in the combined Waikato / Bay of Plenty region for 2014 did not carry into 2015 as previously projected. We now forecast a more constant level of activity at around $2.5b per year throughout the forecast period. There is a higher than typical peak in the value of known project intentions in the Pacifecon known project intentions for 2016 Q4.

Figure 4-14 All non-residential construction for Waikato / Bay of Plenty



Source: Pacifecon/BRANZ

Planned work in Waikato / Bay of Plenty includes:

- civil projects, eg roads of national significance, residential/industrial subdivisions, transport/freight hubs
- industrial buildings, eg timber mills, milk processing plants
- commercial developments, eg business/retail parks
- geothermal plants, and
- retirement villages.

Source: Pacifecon

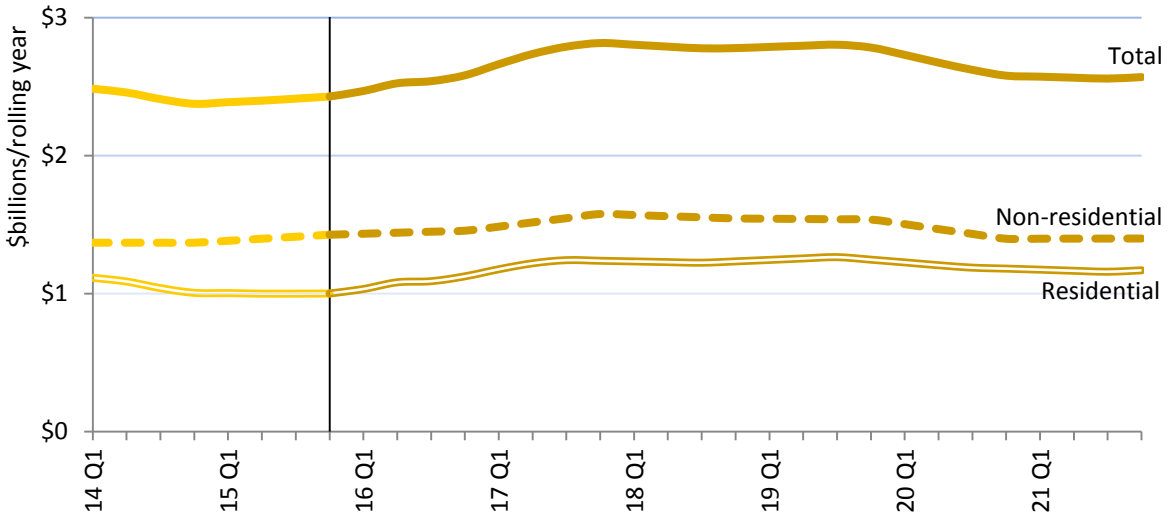
4.4 Wellington[21]

Wellington is expected to grow 16% to a peak in 2017 around $2.8b and to remain above 2015 levels for the remainder of the forecast. Residential building is expected to increase 20% to a peak in 2017 around $1.2b. Non-residential construction is expected to increase 10% to a peak in 2017 of $1.6b.

Wellington is the only reported region with non-residential construction by value at a higher level compared to residential building, and this is expected to continue throughout the forecast period.

21 Wellington includes: Carterton, Kapiti Coast District, Lower Hutt, Masterton, Porirua City, South Wairarapa Districts, Upper Hutt, and Wellington City. Note: in the 2013 report Wellington did not include Carterton, Masterton or South Wairarapa.

Figure 4-15 All construction in Wellington, by value

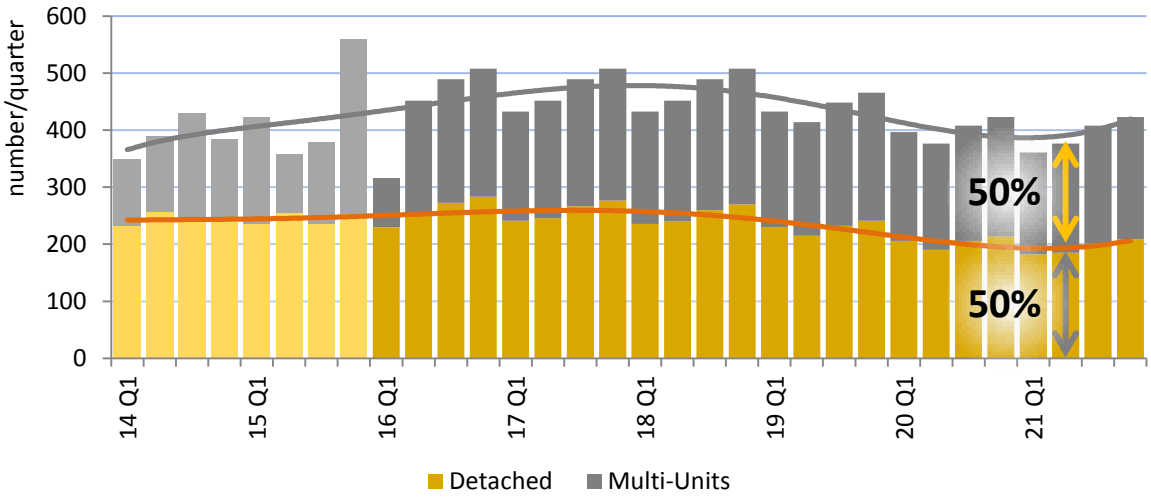


Source: BRANZ / Pacifecon

Wellington dwelling consents

Wellington had the second highest ratio (43%) of multi-unit dwellings consented for 2015 with half of all consents forecast to be multi-unit towards the end of the forecast period.

Figure 4-16 Dwelling units consented in Wellington



Source: BRANZ

Wellington dwelling type history

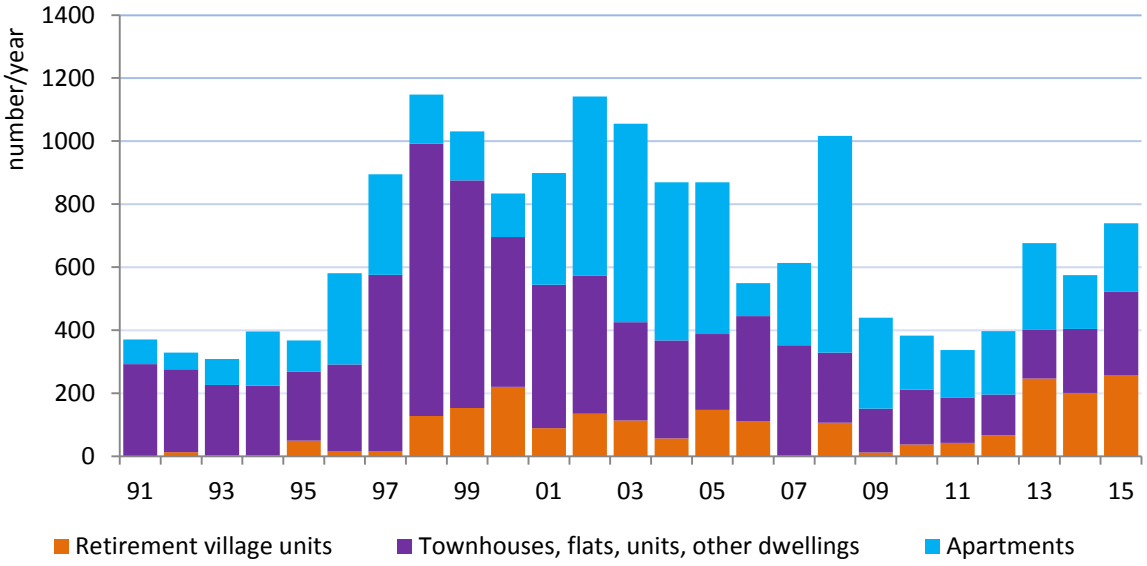
The different types of dwellings all show levels of variability in the historic consent data for Wellington, similar to that described for Auckland with:

- apartments with a high of 688 in 2008 and low of 53 in 1992, a 92% difference,
- retirement village units with a record high of 258 in 2015 and a low of 10 in 2009, a 96% difference,
- townhouses the least variable with a high of 864 in 1998 and a low of 129 in 2012, an 85% difference, and
- detached house consents by comparison are less variable with a high of 1,519 in 2007 and a low of 791 in 2011, a 48% difference.

Table 4-5 Wellington consented dwellings, by type (2014-2015)

Type	2014 (#)	2015 (#)	2014-2015 (%)
Detached	977	982	60
Retirement village units	201	258	14
Townhouses, flats, units, other dwellings	203	265	14
Apartments	171	216	12
Total	**1,552**	**1,721**	**100**

Figure 4-17 Multi-unit dwellings consented in Wellington, by dwelling type (1991-2015)

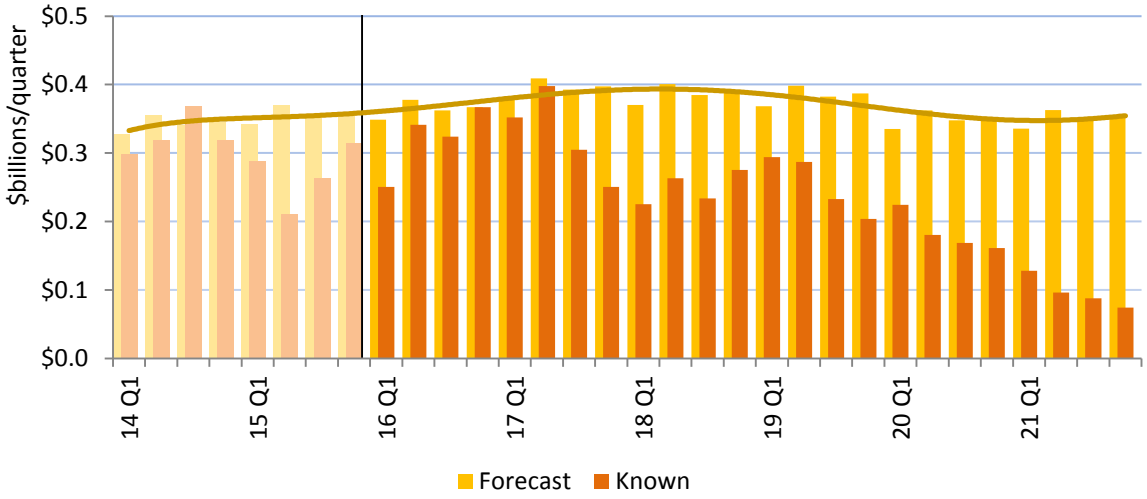


Source: Statistics NZ

Wellington non-residential construction

Annually, all non-residential construction activity is expected to stay reasonably consistent around current levels throughout the forecast period, with a slight $0.1b rise in activity around late 2017.

Figure 4-18 All non-residential construction for Wellington



Source: Pacifecon/BRANZ

Planned work in Wellington includes:

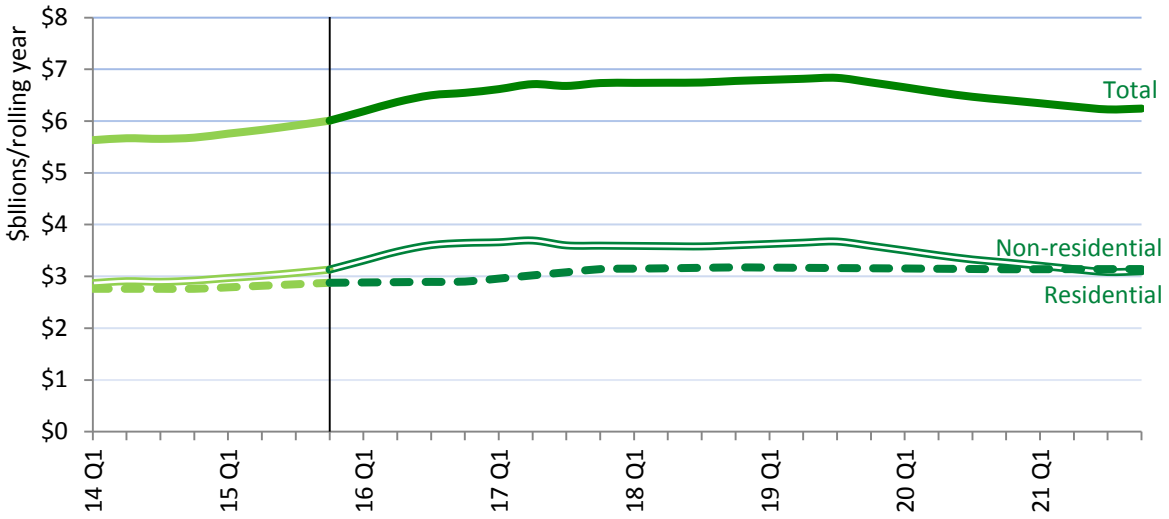
- transport, especially roads and airport
- other civil projects, eg energy, reservoir
- commercial developments, eg retail, business, cultural and tourist facilities, hotels, convention centres, university expansion, civic buildings and own centre developments
- mixed use developments (with mixtures of residential, retail, office and parking), and
- retirement villages.

Source: Pacifecon

4.5 Rest of New Zealand

The Rest of New Zealand includes Hawke's Bay, Manawatu-Wanganui, Northland, Otago, Southland, Taranaki and West Coast. This 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 is forecast to rise to a gentle peak around 2019. All non-residential construction activity is expected to slowly grow throughout the forecast period, with residential building forecast to rise by $0.5b from 2015 levels to a gentle plateau at around $3.6b from 2016-2019, before falling off slightly.

Figure 4-19 All construction in the Rest of New Zealand, by value

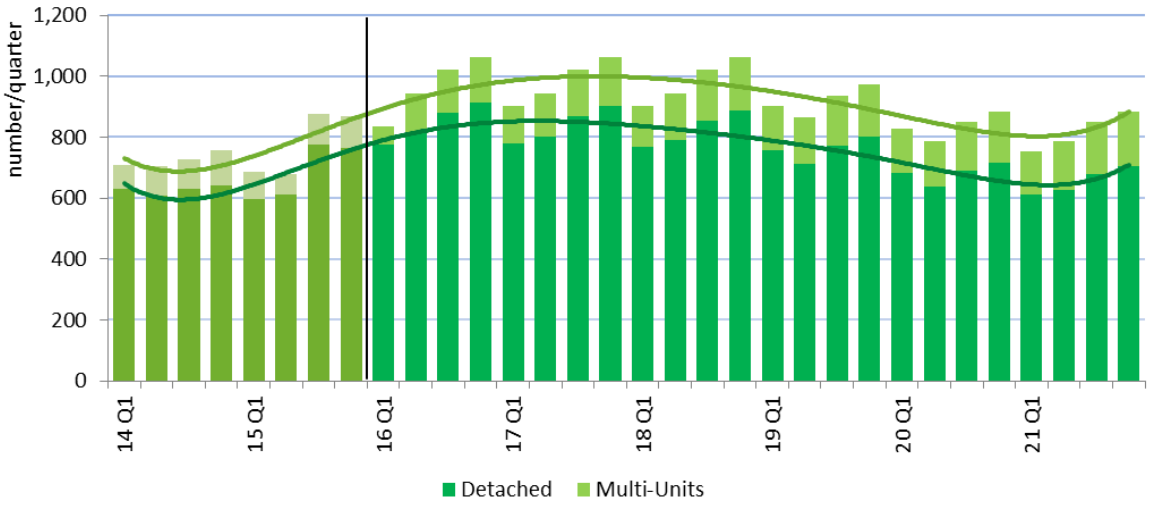


Source: BRANZ / Pacifecon

Rest of New Zealand dwelling consents

The Rest of New Zealand dwelling consents have grown by 26% in 2015. Multi-unit dwelling units represented less than one in every seven (13%) of the total dwelling units consented for 2015 and are forecast to increase to one in every five (21%) by the end of the forecast period.

Figure 4-20 Dwellings consented in the Rest of New Zealand



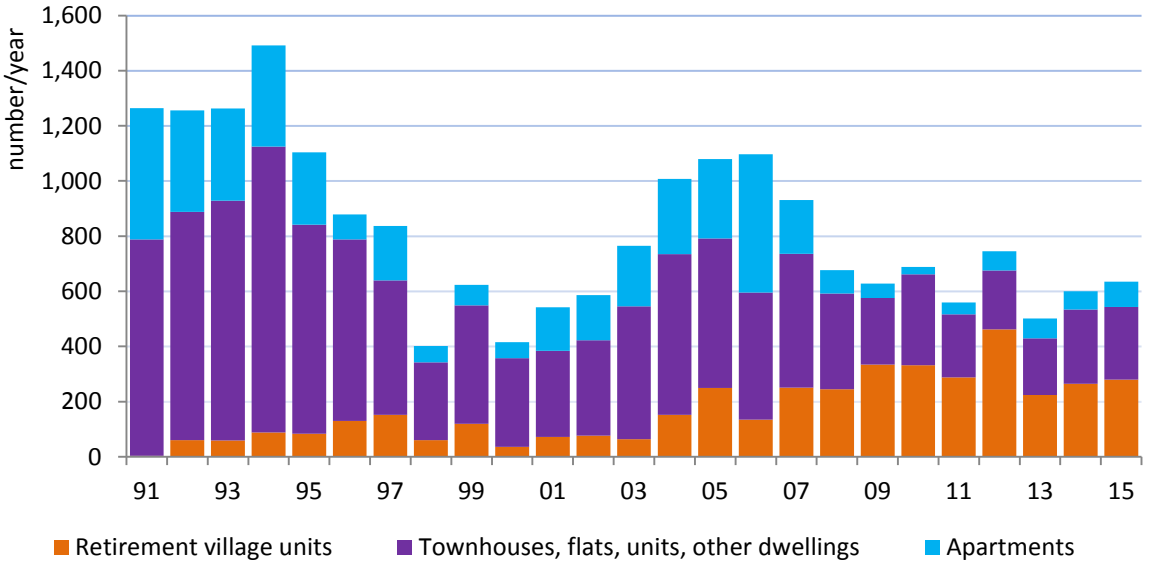
Source: BRANZ

Rest of New Zealand dwelling type history[22]

Table 4-6 Rest of New Zealand consented dwellings, by type (2014-2015)

Type	2014 (#)	2015 (#)	2014-2015 (%)
Detached	3,844	4,132	76
Retirement village units	265	280	4
Townhouses, flats, units, other dwellings	269	263	18
Apartments	66	92	2
Total	**4,444**	**4,767**	**100**

Figure 4-21 Multi-unit dwellings consented in Rest of New Zealand, by dwelling type (1991-2015)



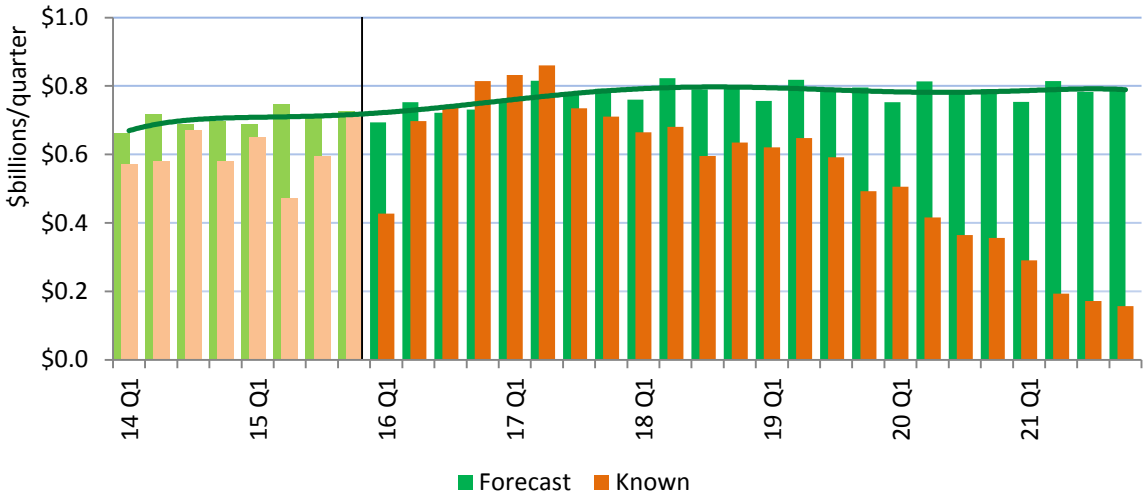
Source: Statistics NZ

Rest of New Zealand non-residential construction

The value of all non-residential construction is projected to increase from 2015 levels by 10% to 2018 and remain at this elevated level of over $3.1b per year to the end of the forecast.

22 Statistics NZ groups multi-unit dwelling consent data into three sub categories: retirement village units; apartments; and townhouses (terraced housing), flats, units and other housing. See Section 3.3 for a more detailed explanation.

Figure 4-22 All non-residential construction for the Rest of New Zealand



Source: Pacifecon / BRANZ

Planned work in the Rest of New Zealand includes:

- energy sector developments, eg hydro and geothermal plants
- heavy industry and industrial projects, eg milk processing plants, saw mills, refineries
- civil projects, eg air, roads, rail, ports, water storage, irrigation schemes
- commercial and recreational developments, eg offices and other business activities, retail (particularly hospitality), ICT, tourist facilities, wineries, hospitals/health facilities, sport, redevelopment of civic facilities
- educational facilities, including both universities and schools, and
- retirement villages (new and expanded)

Source: Pacifecon

Otago has grown considerably since the 2013 report as the largest region in the Rest of New Zealand combined region, and is slowly growing closer to Wellington's level of activity over time.

Table 4-7 All building and construction in the year to 31 December 2016 for the Rest of New Zealand, by region

Region	Residential building ($m)	Anticipated Non-residential projects ($m) [23]
Otago	$1,096	$ 952
Nelson/Marlborough	$533	$ 303
Manawatu/Whanganui	$392	$ 179
Northland	$600	$ 295
Hawkes Bay/Gisborne	$421	$ 360
West Coast	$63	$ 89
Southland	$194	$ 120
Taranaki	$347	$ 74
NZ wide [24]	-	$ 304
Total	**$3,645**	**$ 2,676**

Source: Pacifecon / BRANZ

23 Values in red are from Pacifecon's dataset of anticipated project values and are subject to optimism bias.
24 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 2015 National Construction Pipeline Report

5.1 Adjustments to data from the 2015 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 2014 $ to December 2015 $ to account for inflation as follows:
  - residential buildings 4.9%
  - non-residential buildings 3.4%, and
  - other construction 1.2%.
- A downward revision in Statistics NZ's fixed capital formation data [25]:
  - residential buildings 3.4%
  - non-residential buildings 4.5%, and
  - other construction 8.1%.

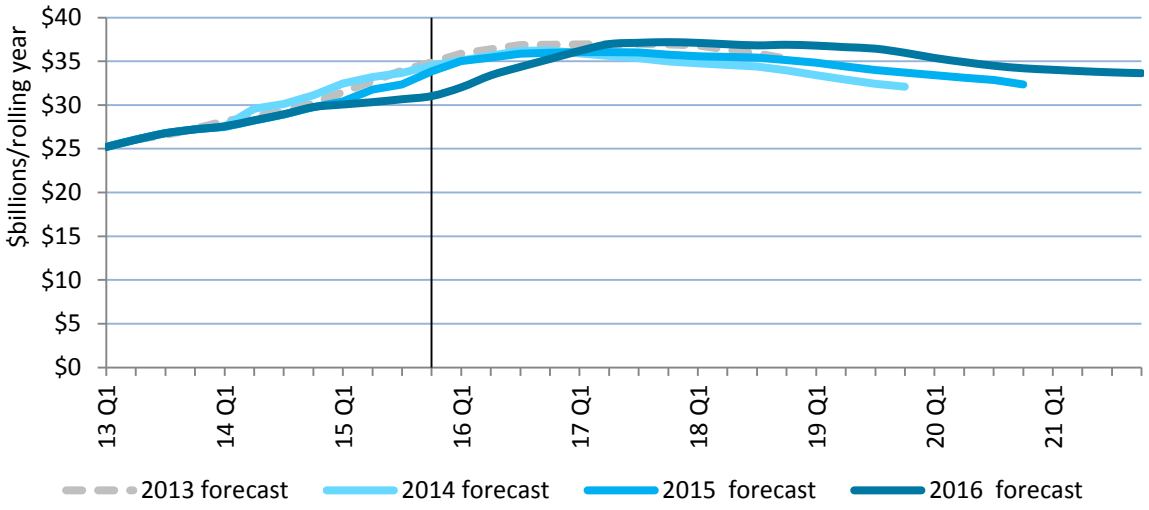
5.2 How well did we do with the last forecast?

The set of National Construction Pipeline forecasts from the 2015 report were a good prediction of what happened in 2015. They were slightly high for residential building, high for non-residential building, and close to actual for other construction. Last year we forecast an expected 14% growth for all building and construction nationally in 2015; the actual recorded growth for 2015 was only 4%. The difference between the forecast and the actual growth for all construction nationally can mostly be attributed to less than expected non-residential building activity.

The revised forecast for 2015 to 2021 for all construction, shows a delay in the previously forecast growth, but retains the shape of the previous forecasts with a smooth long peak that is slightly higher. The total value over the forecast period is expected to be 3.7% higher than the 2015 report. All previous reports have been adjusted to 2015 dollars for comparison, it can be seen that all three previous reports expected higher levels of building activity in 2015 than what was recorded. We expect activity growth to increase over 2016 and into 2017, consistent with the increase in the total value of non-residential construction intentions in the Pacifecon database.

25 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.

Figure 5-1 All construction nationally 2015 and 2016 forecasts compared

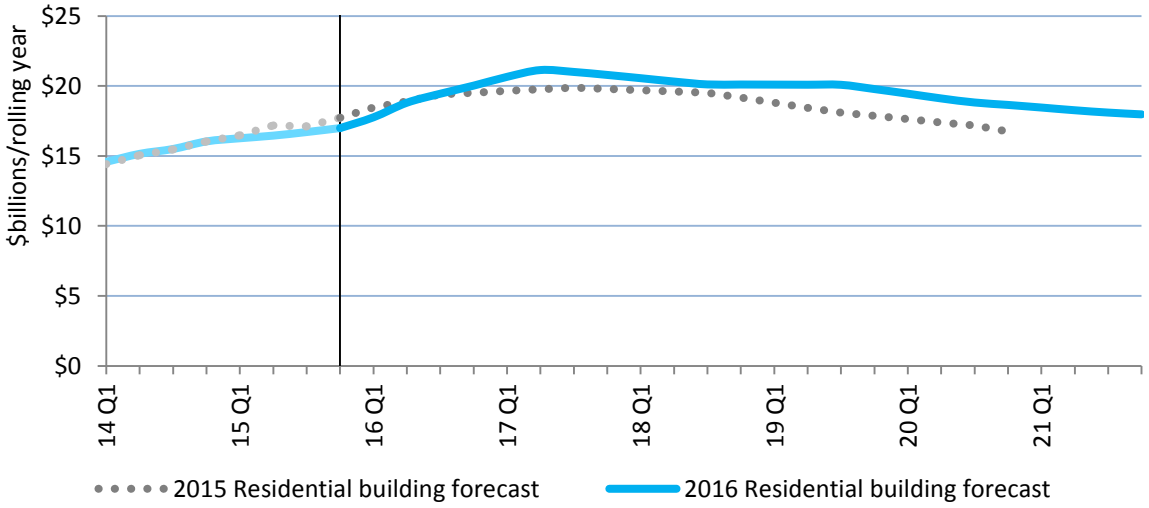


Source: Pacifecon / BRANZ

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 2015 and 2016 forecasts compared



Source: BRANZ

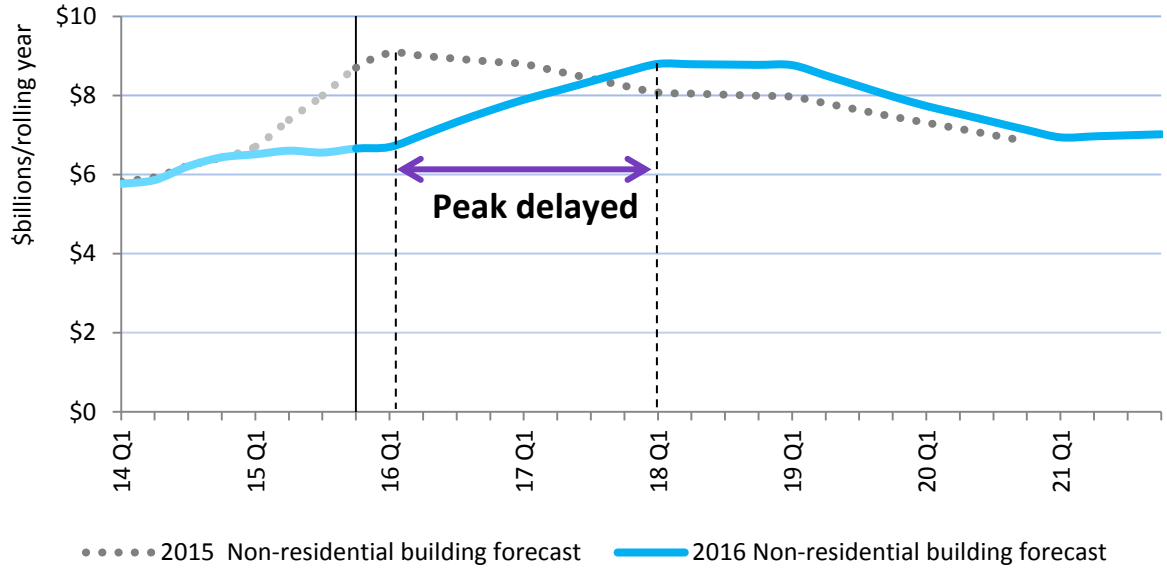
Non-residential building forecast comparison

The previous forecast for non-residential building was significantly higher than actual data recorded for 2015. Although we continue to project growth in non-residential building, consistent with the increase in the total value of construction intentions in the Pacifecon database, the growth is now more gradual with a later and longer peak ($8.8b) in 2018.

Non-residential building growth is still forecast for reasons, including:

- Canterbury anchor projects; and as a consequence privately funded projects reliant on these projects that have been deferred, are expected to get underway
- a number of major university developments, and
- an expected increase in Auckland non-residential building (such as schools and retail) as new suburbs are established and existing suburbs are expanded.

Figure 5-3 Non-residential building nationally 2015 and 2016 forecasts compared

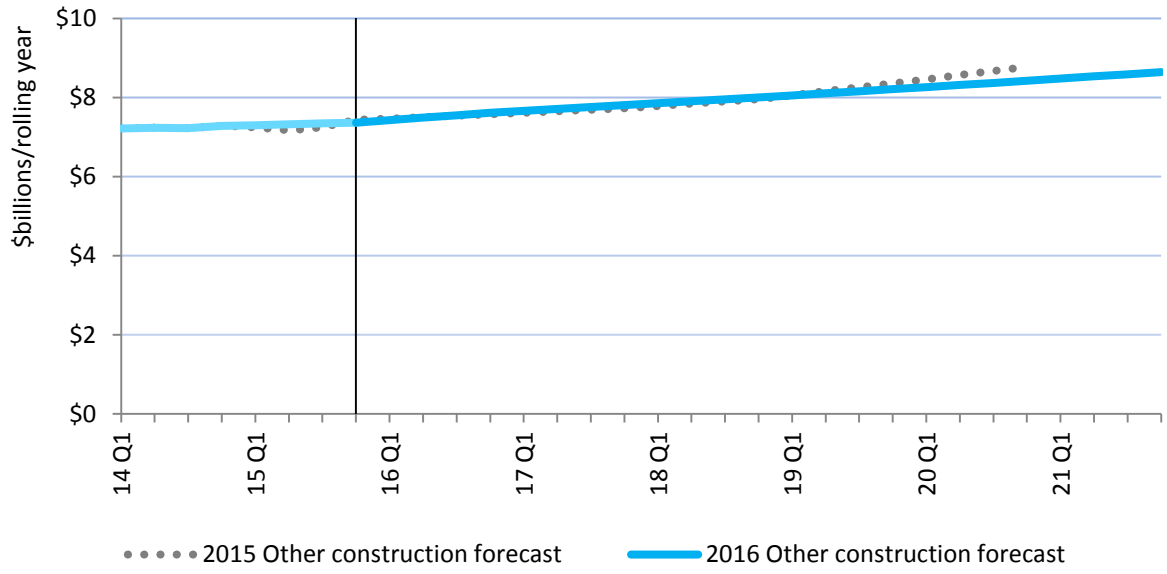


Source: Pacifecon / BRANZ

Other construction forecast comparison

We expected steady growth in other construction in 2015 and the actual data corresponds with this. We revised our forecasting methodology for the 2015 report which achieved more accurate results, so we have re-applied the methodology for this report.

Figure 5-4 Other construction nationally 2015 and 2016 forecasts compared

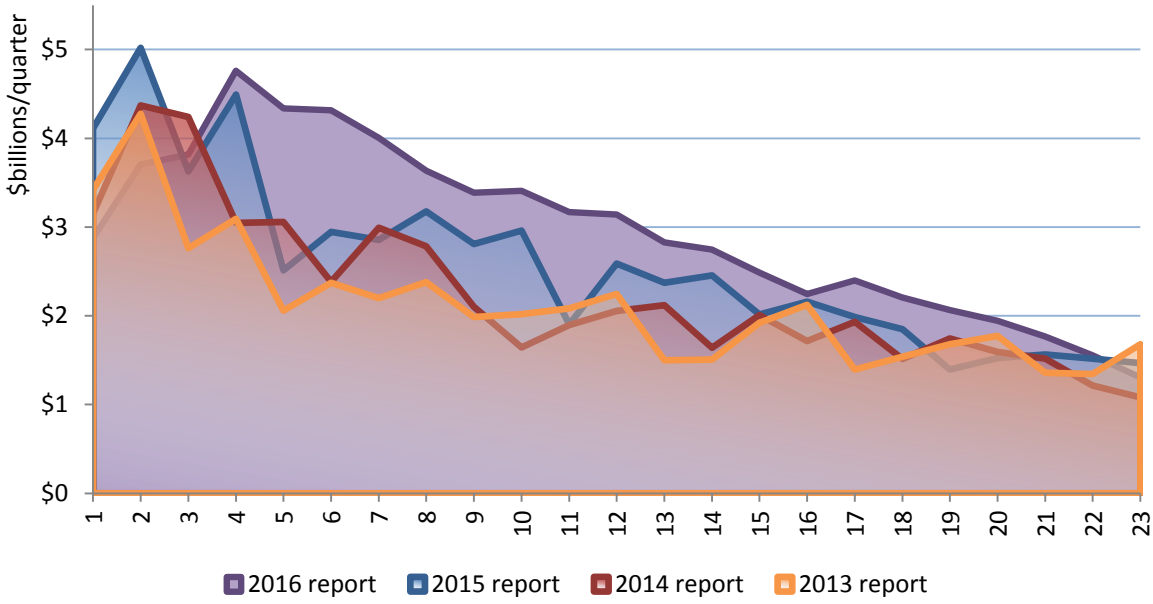


Source: Pacifecon / BRANZ

5.3 Comparison of Pacifecon's 2016 known project data with the previous reports

Pacifecon's data series contains anticipated values and start dates for non-residential buildings and construction projects. This section compares the next six years of Pacifecon's 2016 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 between three and twelve months from the start of each data series. $32b of all non-residential construction activity is anticipated in the first two years of the 2016 known data. This compares with $30b in the 2015 known data. The shaded area below the line represents the volume of known projects for each data series. It is clear that this year's known data represents a greater volume of intentions in the pipeline than in the previous reports.

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



Source: Pacifecon

Pacifecon's dataset shows an increase in the intentions for projects totalling over $100 million, indicating growth expected in all non-residential construction in the coming years. Section 5.5 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 10 compares what was projected with what happened between the four reports. The 2015 report included 20 known projects valued $100 million and over that were anticipated to start between 1 April 2015 and 31 March 2016. 15 of these 20 projects (75%) started as anticipated, compared with nine out of 20 projects (45%) in the 2014 report, and 17 out of 30 projects (57%) in the 2013 report.

About $13.5b (78%) of the total value of work anticipated by the 2015 report did start, compared with $12b (82%) from the 2014 report and $11b (77%) from the 2013 report.

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

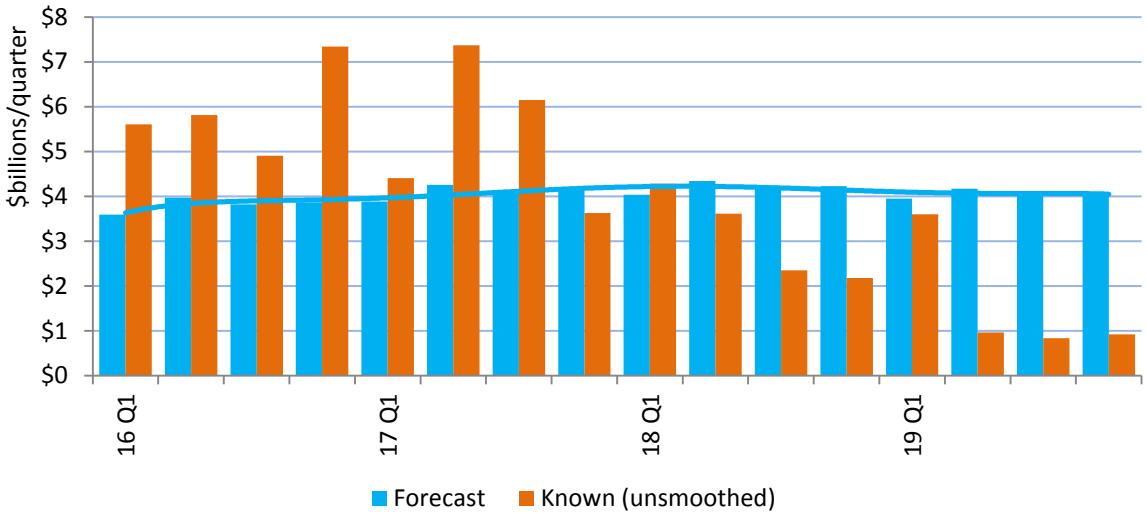
Outcome	Number of projects 2013 report	Number of projects 2014 report	Number of Projects 2015 report
Started as anticipated	17	9	15
Anticipated to start within the coming year	5	8	3
Start date anticipated beyond 1 year	7	3	0
Cancelled since previous report	1	0	2
Total	**30**	**20**	**20**
Additional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

Source: Pacifecon

5.4 Optimism bias in the Pacifecon data set

The optimism bias of all non-residential construction in the Pacifecon dataset can be seen even more clearly in the raw (un-smoothed) data. The 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), is known as optimism bias.

Figure 5-6 All non-residential construction intentions 'raw' data (un-smoothed)



Source: Pacifecon

26 Additional projects starting since the 2015 report: one project new to Pacifecon. Ten other projects' values were raised to over $100 million prior to commencing, or were accelerated so that they started within the April 2015 – March 2016 time period.

5.5 Pacifecon's 'smoothing' process refinement

The total number of projects reported on by Pacifecon has increased from over 6,000 projects in the first report to over 7,000 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 solidify into actual constructions at the intended value. To account for this optimism bias in the data, Pacifecon undertakes a 'smoothing' process to prepare the data for the forecasts. Pacifecon has constantly refined the smoothing process as follows: the highest value projects are studied 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, and for this fourth pipeline report this value has been lowered again to include all projects over $60 million[27]. This process takes into consideration the likelihood of when the project is to start and the duration over which the value of work is likely to be spread out, so the resulting dataset becomes visually 'smoother' with each report as evident in figure 5-5. The thousands of lower value projects are smoothed by the following parameters.

Pacifecon project data treatment outline, by project value:

- $60m+ value (and back in time to January 2011) projects individually examined and value of work spread out over researched number of quarters
- $30m to <$60m, 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.

27 This year over 300 projects over $60 million were individually scrutinised.

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.

We welcome any feedback you may have about this report; please email your feedback to feedback.pipeline@mbie.govt.nz

7 Appendix

7.1 Appendix A – Parties involved in preparing this report

Pacifecon (NZ) Ltd. (referred to as Pacifecon in this report) 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 2021.
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). 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 retirement village units.
b	Billion (10^9).
Base year	The year beginning 1 January 2014.
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 2015 dollars	Real New Zealand dollar value as at December 2015. All values are at December 2015 quarter prices and are inflation adjusted using the capital goods price index.
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, terraced, town houses 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 2016 to 31 December 2021.

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
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 not an exhaustive list of all construction projects
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 Treasury. Its responsibilities include: • formulating, and monitoring progress on, a 20-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/ non-residential building and other construction	The combination of both non-residential building and 'other construction' 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	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.
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, heath 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 2016 Q2 is the aggregate of values from July 2015 through June 2016).
Smoothed	Spreading the total cost of a project over its duration to provide a clearer view of underlying trends and remove seasonal or cyclical components.

Sport construction	Includes: 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 2016, based on Statistics NZ March 2016 release of Gross fixed capital formation data.

Gross Fixed Capital Formation[28]

A series of data sourced from Statistics NZ on Gross Fixed Capital Formation forms the foundation that sets the overall base level of value in the National Construction Pipeline Report, more specifically the three asset classes of residential buildings, non-residential buildings and other construction. Gross Fixed Capital Formation is an element of Statistics NZ's system of National Accounts; it is a subset of Gross Domestic Product.

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 *other construction*. Other construction 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 includes 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 and therefore includes;

- 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 developers profits.

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 therefore includes adjustments to include activities not captured in building consent data.

Residential

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 include:

- Value of work placed includes detached houses, multi-unit dwellings and additions and alterations work. Work placed 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.

28 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.

- Regional household formation forecasts from Statistics NZ have been used. These have been updated by Statistics NZ using 2013 census data, and we have assumed a direct relationship between an increase in household numbers and demand for new dwelling construction. Statistics NZ produce several scenarios and a weighted mix was chosen for our forecasts. The mix was 75% medium and 25% high household formation scenarios. This effectively gives a long-term net migration of about 18,000 per year. Regional demolition replacements are based on regional housing stock age, and Canterbury earthquake recovery. New holiday homes distribution is based on the regional percentage of unoccupied houses.
- Total earthquake demolition replacements in Canterbury are assumed to be 12,000 over a period of eight years from 2011. In the rest of New Zealand, demolition replacements are assumed to be 1,500 per year.
- New, occasionally occupied houses (holiday homes, apartments) are assumed to be 300 per year nationally.
- Historic consents are first published data and there may be subsequent changes in some locations. Usually these revisions are minor.

Changes in residential methodology from the 2015 report

Assumptions used to forecast residential fixed capital formation have changed from the 2015 report. Changes include:

- A revised factor for calculating the value of residential work placed (previously 1.78)[29]. This was done based on revised capital formation data.
- The earlier report did not have 2013 census based household formation forecasts from Statistics NZ. Instead we used their medium regional population forecasts and assumed persons per household trends to calculation household formation. The net migration assumption in the last report was 12,000 per year.
- New, occasionally occupied houses (holiday homes, apartments) were previously assumed to be 1,400 per year (now 300 per year). The lower number is because of the housing shortage in most of our major cities so dwellings remain unoccupied for shorter periods, as well as less demand for holiday homes.
- 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 14,000 per year from 2017 to the end of the forecast period. This reflects the need for time to allow the industry to grow to meet the demand for housing.

The 2016 report's forecasts were recalculated using the revised 2015 fixed capital formation as the starting point. These are the actuals shown for the years 2014 and 2015 in the graphs.

All non-residential construction

The non-residential sector forecasts are based on BRANZ forecasts and combined with data held by Pacifecon. All non-residential construction is made up of *non-residential building* and *other construction*.

[29] This factor was 2.06 in the 2013 report 1.82 in the 2014 report and 1.78 in the 2015 report.

Non-residential building

BRANZ forecasts of non-residential building are based on forecasts of building consent values (which do not include other non-residential construction). The consent values are multiplied by a factor of 1.32 for fixed capital formation using historic ratios between consents and fixed capital formation value, and allowing for an average twelve month lag between the two series. 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.

BRANZ and Pacifecon have provided specific data for rebuild activity in Canterbury, but other regions have been extrapolated from BRANZ data, based on Pacifecon's known projects spread.

Other construction

BRANZ forecasts for other construction 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 11% of other construction fixed capital formation),
- electricity/gas/water sectors (37%),
- transport (33%),
- telecommunications (8%), and
- other (11%).

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, 1.5% per year for electricity/gas/water, 4% per year for transport, 5% per year for telecommunications, and 1% per year for other sectors.

Historical trends are not used for modelling other construction in Canterbury, due to the effect of the Canterbury earthquakes on demand for building and construction in the region. Projections for other construction in Canterbury are based on the Government's $5b post-earthquake infrastructure budget split between 2011 (post-quake) to the end of 2016 and validated against data held by Pacifecon.

Pacifecon's anticipated non-residential projects

A data set of over 7,000 future projects known to Pacifecon has been used in this report. The data is up to date as at 21 February 2016. Smoothed data as at 13 May 2016 has been used in this report. The Pacifecon data set of project values shows the value of all projects of $60m 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 other construction.

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 $500,000, where there is no opportunity for Pacifecon clients.

7.4 Appendix D – Projects likely to start within the next year[30] valued over $100 million[31]

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

Region	Type	Project Initiator
Auckland		
Downtown Shopping Centre	Retail, Offices, Carpark	Private
Hotel	Commercial	Private
Kingseat Village Subdivision	Subdivision	Private
Hotel	Commercial	Private
Takapuna Offices	Commercial	Private
SH1 Puhoi to Warkworth	Roads	Central Govt.
University of Auckland Engineering Building	University	Central Govt.
SH16 Lincoln to Westgate Upgrade	Roads	Central Govt.
Pakuranga Town Community	Community Hub	Local Govt.
AMETI Sylvia Park Bus Station & Road Corridor	Roads & Bus Station	Local Govt.
Canterbury		
SH1 Christchurch Southern Motorway Stage 2	Roads	Central Govt.
Northern Arterial Motorway	Roads	Central Govt.
East Frame	Landscaping & Streetscape	Central Govt.
Nga Puna Wai Sports Hub Stage 1	Sports Complex	Local Govt.
Waikato/Bay of Plenty		
Northgate Freight Hub	Freight Hub	Private
Te Rapa Gateway Industrial Stage 2	Industrial Estate	Private
Metroplex Rangiuru	Business Park	Private
SH1 bypass, Hamilton Section	Roads	Central Govt.
SH2/SH29,Baypark to Bayfair Link	Roads	Central Govt.
SH1 Longswamp Section	Roads	Central Govt.
Wellington		
SH1 Peka Peka to Otaki Expressway	Roads	Central Govt.
Rest of New Zealand		
Jacks Point Village	Hotel & Commercial Precinct	Private
Ammonia-Urea Plant	Industrial	Private
Data Centre	Commercial	Private
Power Station Expansion	Heavy Industry	Private
Dental School	University	Central Govt.
MBIE Telecoms	Telecommunications	Central Govt.
Ultra-Fast Broadband (UFB2)	Broadband	Central Govt.
Ruataniwha Water Storage	Dam	Local Govt.

Source: Pacifecon

30 Year is the 12 months ending 31 March 2017.

31 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 (13 May 2016). Pacifecon's building and construction information is constantly updated.

7.5 Appendix E – Forecast and known data ($ billions) by region – annual totals

Table 7-2 Forecast and known data ($ billions) by region – annual totals[32]

	Actual		Forecast						
Residential	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**
Auckland	5.3	6.1	7.9	9.4	9.6	9.6	9.3	9.0	66.0
Canterbury	4.6	4.0	3.9	3.0	2.4	2.2	2.2	2.1	24.3
Waikato/BoP	2.2	2.8	3.5	3.6	3.3	3.2	2.8	2.6	24.0
Wellington	1.0	1.0	1.1	1.2	1.2	1.2	1.2	1.2	9.2
Rest of NZ	2.9	3.1	3.6	3.6	3.6	3.6	3.3	3.1	26.9
TOTAL	16.0	17.0	20.0	20.8	20.1	19.8	18.6	18.0	150.3
Non-residential									
Auckland	4.7	4.9	5.6	6.3	7.3	7.0	6.8	7.0	49.6
Canterbury	2.6	2.4	2.9	2.9	2.4	2.0	1.8	1.7	18.7
Waikato/BoP	2.3	2.4	2.3	2.5	2.4	2.4	2.4	2.4	19.3
Wellington	1.4	1.4	1.5	1.6	1.5	1.5	1.4	1.4	11.7
Rest of NZ	2.8	2.9	2.9	3.1	3.2	3.2	3.1	3.1	24.3
TOTAL	13.7	14.0	15.2	16.4	16.8	16.2	15.6	15.7	123.6
All construction									
Auckland	10.0	10.9	13.5	15.6	16.8	16.6	16.1	16.0	115.7
Canterbury	7.1	6.5	6.8	5.9	4.8	4.2	3.9	3.7	42.9
Waikato/BoP	4.5	5.2	5.8	6.1	5.7	5.6	5.2	5.1	43.3
Wellington	2.4	2.4	2.6	2.8	2.8	2.8	2.6	2.6	20.9
Rest of NZ	5.7	6.0	6.5	6.7	6.8	6.7	6.4	6.2	51.1
TOTAL	29.8	31.0	35.3	37.2	36.9	36.0	34.2	34.1	273.9
Known non-residential									
Auckland	3.8	5.3	5.7	6.5	5.1	3.9	3.3	2.7	36.2
Canterbury	2.5	2.8	3.2	3.2	2.6	1.6	1.6	1.3	18.8
Waikato/BoP	1.7	0.9	2.4	2.1	1.8	1.5	1.3	0.7	12.4
Wellington	1.3	1.1	1.3	1.3	1.0	1.0	0.7	0.4	8.1
Rest of NZ	2.4	2.4	2.7	3.1	2.6	2.4	1.6	0.8	18.0
TOTAL	11.6	12.5	15.2	16.3	13.1	10.3	8.6	6.0	93.5

Actuals are shown in blue.
National and regional peaks are shown in red.

[32] Any differences between figures within Appendix E and tables and charts in other sections of this report are due to rounding.

PO Box 33016, Auckland 0740

P 09 445 0345

F 09 445 0244

projects@pacifecon.co.nz

www.pacifecon.co.nz

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