Chairperson and Committee Members
STRATEGY AND POLICY COMMITTEE

6 SEPTEMBER 2018

Meeting Status: **Public**

Purpose of Report: For Information

UPDATE ON THE NATIONAL POLICY STATEMENT ON URBAN DEVELOPMENT CAPACITY AND FINDINGS FROM THE REPORT ON FUTURE DEMAND FOR BUSINESS LAND IN THE WELLINGTON REGION

PURPOSE OF REPORT

1 This report provides an overview of work underway to implement the National Policy Statement on Urban Development Capacity (NPS-UDC) and a summary of the findings of the report 'Demand for business land in the Wellington region', undertaken as the first part of the work to assess the potential development capacity of business land in Kāpiti and across the other Wellington councils.

DELEGATION

2 The Committee has the delegation to consider this matter under Section B.1 of the Governance Structure and Delegations: *This Committee will deal with all strategy and policy decision-making that is not the responsibility of the Council.*

BACKGROUND

Background on the NPS-UDC

3 The NPS-UDC requires high and medium growth councils to assess development capacity for residential and business demand every three years. This requires Councils to analyse and assess both the demand for business and residential land and determine whether or not an adequate quantity of developable land is available for that future demand over the next three, 10 and 30 year timeframes. In addition, the Council is required to complete regular reports which track market indicators such as house sales, rents and levels of development activity.

4 The purpose of these assessments is to ensure that there is sufficient development capacity available to meet changing residential and business needs across growth areas. The reporting requires identifying enough development capacity at three, 10 and 30 year periods. Tests for 'sufficient' capacity include the need for land to be (or planned to be) serviced with infrastructure and it is feasible for this land to be developed by the market over these timeframes.

5 Kāpiti Coast is a medium growth council along with Wellington, Porirua, Lower and Upper Hutt City Councils, and Greater Wellington Regional Council. The councils are working together to produce a joint assessment of development capacity across the Wellington urban area, as encouraged by the NPS-UDC.

6 To complete this assessment it is necessary to understand both the demand for residential and business land and the supply of land (zoned and serviced) to meet that need. Council is currently working with Wellington City Council to use a model to assess the demand and supply of current land zoned for residential development in the District Plan. This work is on-going and will be completed towards the end of the year.

7 In addition to the residential work, Council has been progressing work to identify future business demand.

Understanding business demand

8 In late 2017, Sense Partners, Wellington economists, were commissioned by the Wellington councils to undertake an assessment of the future demand of business land using the NPS- UDC timeframes of 3,10 and 30 years.

9 The report provides an overview of past business growth across the region. This includes an analysis of the factors driving business demand including demographics, employment and economic performance across key business sectors (commercial, retail, industrial, government, health education and training and other).

10 Future forecasts of population growth and labour force participation are then used to model future economic activity and demand across the different business sectors. A number of future changes are also factored into forecasts for future demand. This includes such things as increasing floorspace ratios for workers, the impact from online retailing and changes to the nature, type and location of business use.

11 Population growth is one of the key determinants of future demand for business as demographic trends influence overall demand and drives the labour force. Modelling within the report uses the StatsNZ medium population projection as its baseline but also provides other scenarios for growth through the StatsNZ high population projection and the ID Profile population forecast, which all councils across the Wellington area use.

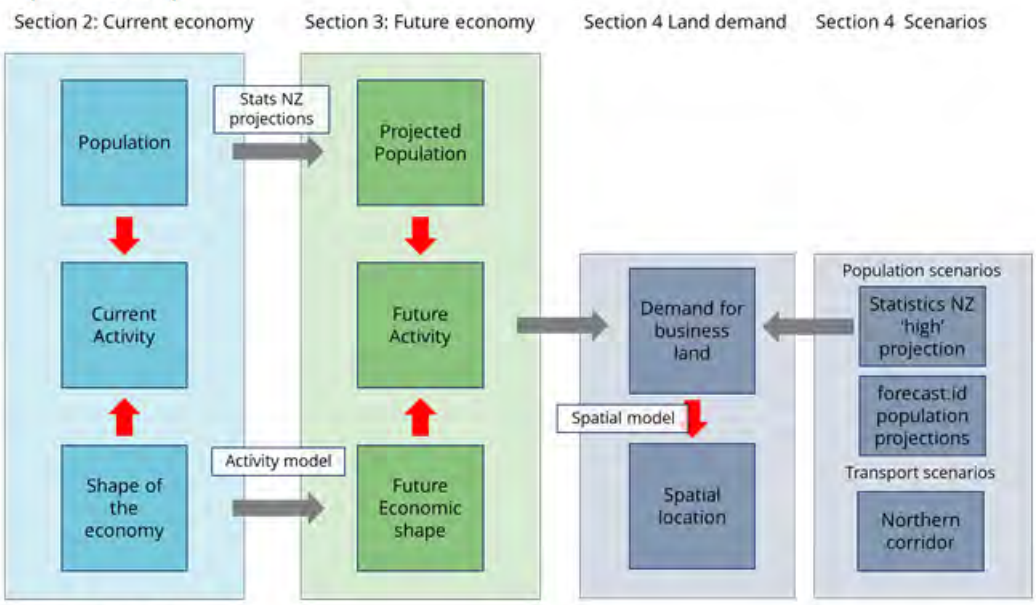
12 The use of different growth scenarios ensures that the recent higher population growth is included. Modelling the higher scenario and the ID Profile projections, in addition to the medium scenario, provides a range of growth scenarios and circumstances for councils to consider.

13 The model also tests the impacts of transport improvements on business demand as another scenario, where reduced travel time and costs of shifting people and freight across the region influence demand.

14 The outcome of modelling identifies future demand as additional floorspace (m2) and then converts it into corresponding land area (hectares) across each of the six sectors across the three, ten and thirty year periods as set out under the NPS-UDC.

15 The figure below outlines the approach Sense Partners used to develop future demand for business.

FIGURE 2: WE TAKE A STAGED APPROACH TO ASSESSING BUSINESS LAND DEMAND



Source: Sense Partners

Factors of growth in the Wellington Region

16 The report identifies the Wellington region as having a complex economy, being large and diversified that specialises in many industries. Wellington is only second to Auckland, with most other regions in New Zealand tending to be highly specialised in only a few things.

17 Economic activity for Wellington is expected to continue to grow over the next 3, 10 and 30 year periods, reflecting it size, its home to government, high proportion of highly skilled people and projected population growth.

18 The report identifies Wellington sub-regions as playing different roles, but being complementary to each other. With most government sector jobs based in Wellington and Upper Hutt, neighbouring councils provide many of the supporting domestic services. Health, education and aged care are more prominent outside of Wellington city.

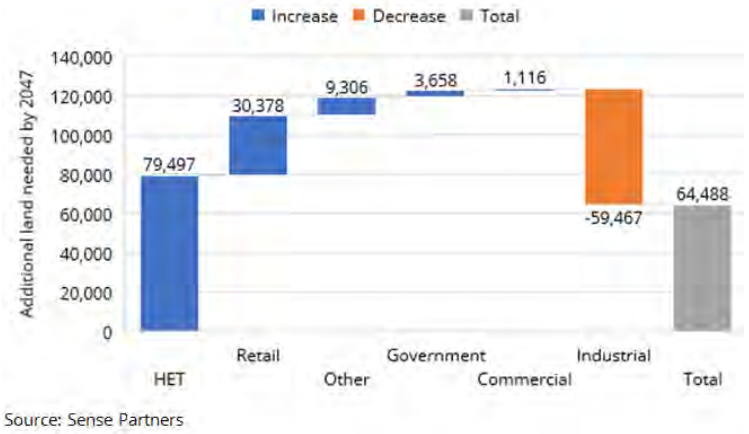
19 Looking to the future, the region's success is seen to be tied to growth in a number of different commercial groups. These include skilled services, government, health, education, finance and tourism. These growing sectors account for 60% of jobs in the study area and will lead to increasing demand in commercial and government space.

20 The report also identifies that industrial activity is flat and likely to decline across the region over the 30 year period, reflecting a shift away from manufacturing to a services led economy. At the same time, industrial land is intensifying and shifting location. Historic heavy industry use is moving more towards logistics, printing and food manufacturing, while some firms are relocating their base of operations to minimise risks from earthquakes and sea level rise.

Future Business Demand in Kāpiti

21 Kāpiti Coast firms are set to demand more land across a range of sectors. Based on the StatsNZ medium baseline, the outlook for Kāpiti is for modest growth across commercial, retail, industrial and even government. The health and education sector is particularly strong.

22 This forecast would require an additional 64,488 square metres of land to meet business needs for Kāpiti to 2047.



Source: Sense Partners

23 Other scenarios used in the report to forecast business growth identify an additional 285,070 square metres (StatsNZ high projection), or 191,865 square metres (ID forecast) over the same period.

24 Over the past 10 years, healthcare has added 787 jobs, almost all of the new job growth in the Kāpiti economy; and is increasing its share of the local economy. The modelling sees this recent activity continue, which will lift future needs for land in this area.

25 Kāpiti is also identified as benefiting more than other councils from the current transport projects along Wellington's northern corridor. This sees the baseline demand for business land increase across the next 30 years from the improved access. However, the report identifies uncertainty around this and considers that baseline population growth as a more robust determinant on demand relative to the impacts of transport projects.

26 The figure below shows the comparative demand for business land across the different growth scenarios for each of the four councils.

FIGURE 1: MOST COUNCILS SHOW MODEST GROWTH (%) IN BUSINESS LAND DEMAND

Change in total business land demand by local council, percent relative to 2017

	Kāpiti Coast		Lower Hutt		Upper Hutt		Wellington City	
Horizon	10-yr	30-yr	10-yr	30-yr	10-yr	30-yr	10-yr	30-yr
Baseline	0.82	4.78	-4.77	-12.07	8.86	10.51	3.32	3.89
forecast.id	1.31	14.24	-6.83	-7.12	5.81	15.56	2.87	3.87
High projection	7.16	21.15	1.39	2.98	16.32	31.95	8.89	17.40
Transport links	1.73	7.63	-4.46	-11.23	9.16	11.45	3.70	5.03

Work underway to understand the availability of business land

27 This report forms the first part of the overall assessment of development capacity. The councils are currently working together to identify the current supply of business land available for development (amount and yield). This involves identifying and assessing vacant land that is currently zoned for business use across District Centre, Town Centre, Local Centre, Industrial, Airport and Outer Business zones under the Proposed District Plan.

28 Outcomes from this work will be completed over the coming months and included in the report on the assessment of development capacity and identify if there is 'sufficient' capacity available across the district to meet business needs across the 3, 10 and 30 year timeframes.

Quarterly Monitoring - tracking growth and change

29 In addition to this assessment of development capacity, Council has been undertaking quarterly monitoring under the NPS-UDC. Monitoring helps identify and track some of the drivers, changes and pressures from development markets alongside the changing needs and demand from our local communities.

30 Council has produced four quarterly monitoring reports to date. The reports identify changes and trends relating to a number of market and price efficiency[1] indicators, primarily relating to housing activity. The first report was produced in September 2016 and provided context around the current and historic changes across the district including population make-up, future demographic changes, development activity, housing sales and rental data, and the level of housing affordability across Kāpiti.

31 Subsequent reports have provided updates on key indicators, introduced new price efficiency indicators, and provided results of relevant research and information.

32 A more comprehensive report will be repeated for September 2018. This will consolidate information from across the last year and provide analysis of the changes and trends and impact these have on the district in terms of available stock and affordability.

33 This monitoring information will also feed into the assessment of development capacity.

CONSIDERATIONS

Policy considerations

34 The business demand analysis also has a number of links to other areas of Council's work. The report is currently being used to support work on the appeals to the Proposed District Plan, as part of the evidence around current and future demand for business zoned land.

35 The report can also assist work on economic development, and the special projects of the regional provincial growth and the regional investment plan the Council is currently engaging in.

[1] Market indicators include the numbers and sale prices of housing and monthly rental prices. Price efficiency indicators include housing price to cost ratio and price differences in land across different zonings e.g. residential versus rural or industrial.

36 Once the full report of both demand and capacity is completed, Council, iwi, the development community and wider public, will be in a better position to understand the future growth and development for the district.

Legal considerations

37 There are no legal considerations from this report.

Financial considerations

38 There are no financial considerations from this report.

Tāngata whenua considerations

39 Te Whakaminenga o Kāpiti will also receive a briefing in October on work to implement the NPS-UDC and the findings from this report on business demand.

Strategic considerations

40 The report on business demand and the final assessment of development capacity over the next 3, 10 and 30 year timeframes will help support planning for infrastructure investment which is aligned with growth projections and a more diverse range of businesses in the district. In addition this works supports a number of Council's long term goals, including:

- a strong economy with more jobs and higher average wages;
- a resilient community that has support for basic needs and feel safe and connected; and
- an attractive and distinctive Kāpiti identity and sense of place that make people proud to live and play here.

41 This evidence based process will assist Council in both strategic and site specific decisions relating to development and growth.

SIGNIFICANCE AND ENGAGEMENT

Significance policy

42 This report has a low level of significance under Council policy.

Consultation already undertaken

43 Kāpiti Airport and Coastlands were both interviewed by Sense Partners to test the findings and assumptions made for future business for Kāpiti. No other consultation has been undertaken.

44 Council plans to engage with local iwi and the development community once draft findings from the assessment of development capacity report are available.

Publicity

45 The report is also available to the other councils working together on the NPS-UDC work. This report provides the initial analysis of the demand for business land across the district and will be part of the assessment of development capacity.

46 The report will also be used to inform discussions with the development community to inform work around the assessment of development capacity.

RECOMMENDATIONS

47 That the Strategy and Policy Committee receives this report and notes the findings of the report 'Demand for business land in the Wellington region'.

Report prepared by	**Approved for submission**	**Approved for submission**
Hamish McGillivray	Natasha Tod	Kevin Black
Senior Policy Advisor	**Group Manager Regulatory Services**	**Acting Group Manager Strategy and Planning**

ATTACHMENT

Appendix 1 Demand for business land in the Wellington region

Demand for business land in the Wellington region

From today's economy to future needs

May 2018

SENSE PARTNERS
DATA LOGIC ACTION

Key points

The region needs to plan for land demand growth…

The Wellington region needs to plan for continued growth in demand for business land

- Despite changes to the structure of the local economy, the Wellington region will demand extra business land over the next 3, 10 and 30 years
- Our baseline estimates suggests demand for land grows 3.9 percent in Wellington City, 4.8 percent in Kapiti and Upper Hutt grows 10.5 percent by 2047
- We expect demand for Lower Hutt business land to fall due to a continued shift from industrial to services activity and intensification of industrial land use activity

Demographic assumptions drive the extent to which additional land is required

- Our central estimates use Statistics New Zealand's median population projections
- There is merit in adopting Statistics New Zealand's 'High' projection as a scenario. Under a high population scenario, additional demand lifts 14 percent by 2047
- Regional business land requirements from a forecast.id population projection are not much different to our baseline but there are local differences (see figure 1)

Transport infrastructure improvements lift demand, but demographics matter more

- Many related transport infrastructure projects are reducing travel times and the costs of shifting people and freight across the region
- These projects impact on the location and magnitude of demand for business land
- But the scale of transport impacts is limited – reasonable assumptions on population growth rates matter more for the aggregate outlook (see figure 1 for comparison)

…and factors, such as increased utilisation of floorspace, also reduce demand

- Based on trends in sectoral activity we expect industries to moderately intensify floorspace utilisation over coming years
- This includes is a shift from heavy industry, to lighter industries which use less land
- These factors moderate the demand for business land assumptions across the region – our estimates are contingent on both assumptions

Floorspace demand and our floor-to-land assumption drives the business land demand

- To forecast business land demand, we need to make assumptions on how floorspace is accommodated across the region
- Assessing the ratio of floorspace of land is not straightforward – we make local assessments at a sector level and suggest sensitivities for future robustness work

FIGURE 1: MOST COUNCILS SHOW MODEST GROWTH (%) IN BUSINESS LAND DEMAND

Change in total business land demand by local council, percent relative to 2017

	Kapiti Coast		Lower Hutt		Upper Hutt		Wellington City	
Horizon	10-yr	30-yr	10-yr	30-yr	10-yr	30-yr	10-yr	30-yr
Baseline	0.82	4.78	-4.77	-12.07	8.86	10.51	3.32	3.89
forecast.id	1.31	14.24	-6.83	-7.12	5.81	15.56	2.87	3.87
High projection	7.16	21.15	1.39	2.98	16.32	31.95	8.89	17.40
Transport links	1.73	7.63	-4.46	-11.23	9.16	11.45	3.70	5.03

…understanding industry and local nuances is critical

…disaggregating demand by economic sector matters for planning purposes

- Our projections suggest industrial activity will be flat at best, and is likely to decline, across a 30-year period, consistent with a shift away from manufacturing to a services-led economy
- Industrial land use is also intensifying, as the mix changes away from heavy manufacturing activity towards logistics, printing and food manufacturing
- At the same time, current business land requirements for industrial uses are moving, as firms seek to mitigate risks from earthquakes and sea-level rise. Councils need to assess the current state before planning for the next 3, 10 and 30 years

Local councils' experiences differ: expect demand in Wellington City to grow modestly

- Wellington City's exposure to the Government and Commercial sectors sets the tone for the region posting modest growth in business land demand over the next 30 years
- Government is expected to grow as a fraction of the local economy and commercial services and health, education and training workers also sustain growth in the city
- The population growth rate in future years and our assumption of a modest rate of intensification in floorspace used are key risks to the outlook for Wellington City

…how the industrial sector unfolds determines business land demand in Lower Hutt

- Our baseline estimates suggest a shift away from industrial activity will reduce demand for industrial activity in Lower Hutt
- This reduced demand is partially offset by growth in demand for land to accommodate more commercial, retail and health, education and training activity

…business land demand in Upper Hutt is also contingent on industrial activity

- Demand for business land in Upper Hutt swings on the outlook for industrial activity that our model suggests is weaker by 2047 than the current state of activity
- Since industrial activity is not particularly intensive, small changes in activity could lead to relatively large changes in demand for industrial business land in Upper Hutt
- Right now, demand for business land in Upper Hutt is increasing. This is driven by 3 factors:
    - Stronger than expected population growth across the Wellington region
    - An improvement in the outlook for logistics, food manufacturing and other light industrial activities
    - A relative shift towards industrial land in Upper Hutt that has lower earthquake and sea-level rise risks than some other locations in the region

…Kapiti Coast firms are set to demand more land across a range of sectors

- The outlook for Kapiti is for modest growth across commercial, retail, industrial and even government. The health and education sector is particularly strong
- Kapiti is also likely to benefit more than others from the development of a set of transport infrastructure projects on Wellington's northern corridor
- Our estimates show these projects lift demand 2.5 percent by 2047, but there is uncertainty. Baseline population growth has a large impact on demand relative to the impacts of transport projects

…the current and future economy shapes demand

Economic activity set to grow in the Wellington region

- Economic activity will continue to grow across the Wellington region over the next 3-, 10- and 30-year periods.
- Employment has recovered from the GFC. Strong population growth boosts activity.
- Expect employment growth to moderate from the current pace over future periods.

Wellington is unusual among New Zealand regions.

- The Wellington region is a very complex economy. It is a large and diversified economy, that specialises in many industries. This specialisation help determine demand for floorspace and hence business land.
- Auckland is the only other comparator – most regions in New Zealand tend to be highly specialised in only a few things

Wellington City exhibits some typical pull factors of large urban centres

- Wellington benefits from its size, as seat of government, as a place with significant concentration of highly skilled and entrepreneurial people.
- We anticipate the Government sector will grow at a rate close to or a little below the national economy. That means the Government sector grows at a slightly faster rate than the Wellington economy and increases as a share of the region's employment.
- While these are the visible engines of growth, there is a wide array of businesses that service these industries and the wider economy

Wellington sub-regions are different but complementary.

- Most government sector jobs are in Wellington and Upper Hutt.
- But domestic services, which are complementary and necessary to smooth functioning of the regional economy, are in neighbouring territorial authorities.
- Health, education and aged care are more prominent in outside of Wellington city.

Local impacts vary across the region

- To help understand the spatial demand for business land, we forecast employment growth by industry for each of the districts within our study.
- Industry composition makes for significant differences at the district level, we expect:
  - Growth in Lower Hutt to be a little lower than elsewhere because of exposure to industrial activity and manufacturing
  - Government increases Upper Hutt employment moderated by other sectors.
  - Kapiti benefits from an increasing share of employment in Health, Education and Training and related industries
  - Expect Wellington City to benefit from strong Government and Commercial growth.

The region's success is tied to some structurally growing industries

- These include skilled services, government, health, education, finance and tourism.
- These structurally growing industries account for 60% of jobs in the study area and will lead to increasing demand in commercial and government space.
- There are also structurally declining industries like manufacturing, wholesale trade, distribution and media. This is likely to reduce demand for industrial space.

Contents

Context

This report helps councils think about the outlook for the regional economy, assesses demand for business land 3, 10 and 30 years from today and responds to the requirements of the National Policy Statement on Urban Development Capacity (NPS-UDC). It is intended to help four councils across the Wellington region – Kapiti Coast, Lower Hutt, Upper Hutt and Wellington city – plan.

The report begins by highlighting the economic drivers of current activity within the Wellington region before modelling future economic activity. Then the report translates projections of economic activity to demand for floor area and land use for each of the four local councils that form the study area. In addition to the quantum of land area and floor area, we consider scenarios with stronger population growth and with the impact of transport infrastructure improvements to the Northern corridor.

As part of informing and testing our modelling and interpretation of results, we met with many companies, developers and firms active in the construction sector, including: Kapiti Airport, Coastlands, Richard Burrell, Malcolm Gillies, Victoria University of Wellington, Naylor Love, the Government Property Group, the New Zealand Property Council (Wellington Branch) and Master Builders. We thank MR Cagney for assistance with the report.

Figures

Key Points

Overview

The current economy

The future economy

Business land demand

Appendices

1.Overview

The prime purpose of this report is to quantify demand for business land for four councils – Kapiti, Lower Hutt, Upper Hutt and Wellington City – within the Wellington region.

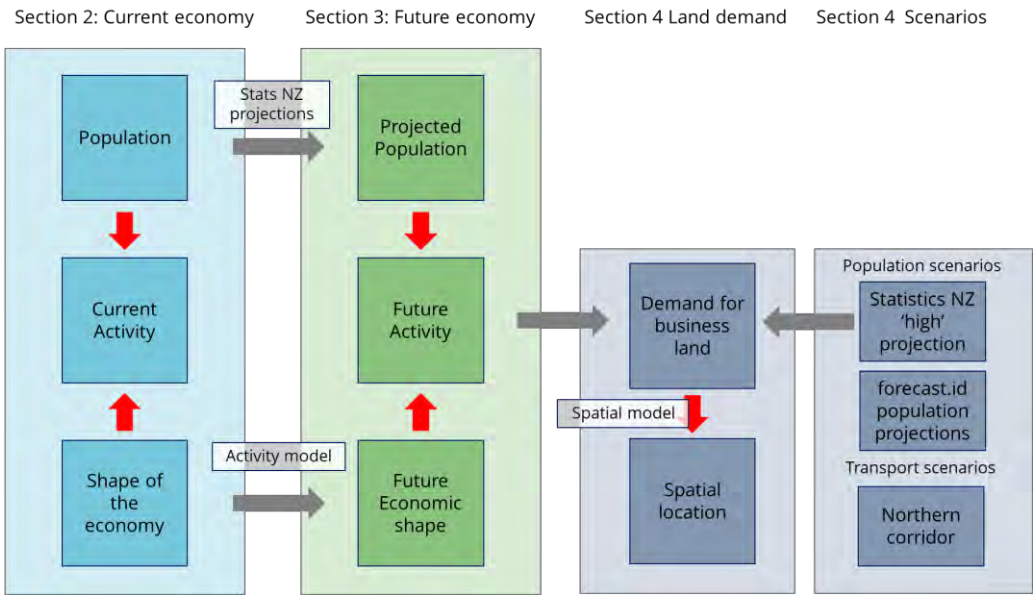
To quantify business land demand, we first focus on firms and the local business environment, setting out the key local economic drivers in section 2 of the report. We highlight local trends and the complexity of the local economy. These factors are critical for understanding the future shape of the Wellington economy and the intensity of land demand per worker.

In section 3 of the report, we introduce an economic model use to forecast the future economic activity in terms of the number of workers in each council across 6 different industries: Commercial, Government, Retail, Industrial, Health and Education and a catch-all 'Other' group.

Section 4 first translates our projections of economic activity into demand for floor area based on assumptions on the floorspace each worker will require in the future. Then we use local floor-to-area ratios for each local industry and council to project future demand for business land.

In addition to our baseline case, section 4 also explores scenarios that relate to population growth and the impact of improvements to local roading infrastructure. These scenarios show the range of possible outcomes. As far as possible, councils should consider these alternative outcomes when planning for future growth. We make some concluding remarks along these lines in section 5.

FIGURE 2: WE TAKE A STAGED APPROACH TO ASSESSING BUSINESS LAND DEMAND
Report roadmap



Source: Sense Partners

2. The current economy

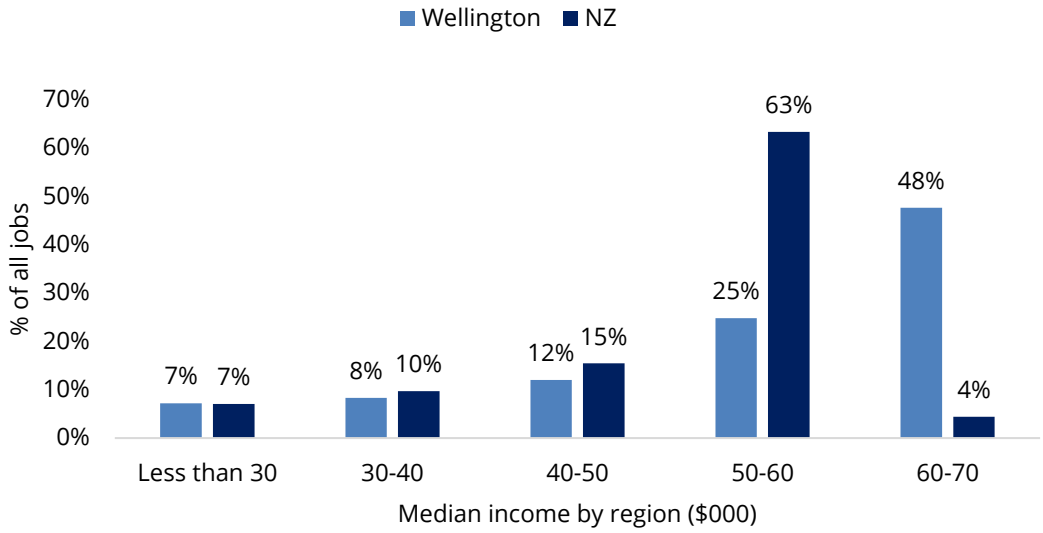
2.1 Drivers of growth

2.1.1 The Wellington region is different

Incomes are much higher in Wellington

Wellington's high incomes stand-out as a key difference relative to the rest of the country. Almost half of all jobs in the Wellington region land at $60,000 or more. That makes for a significant wage premium compared to the rest of New Zealand. Figure 3 shows most jobs peak out at $50,000-$60,000 in the rest of the country.

FIGURE 3: WELLINGTON HAS MORE HIGH PAYING JOBS COMPARED TO ELSEWHERE
Employment by income band, Wellington Region vs New Zealand



Source: Statistics New Zealand, Sense Partners

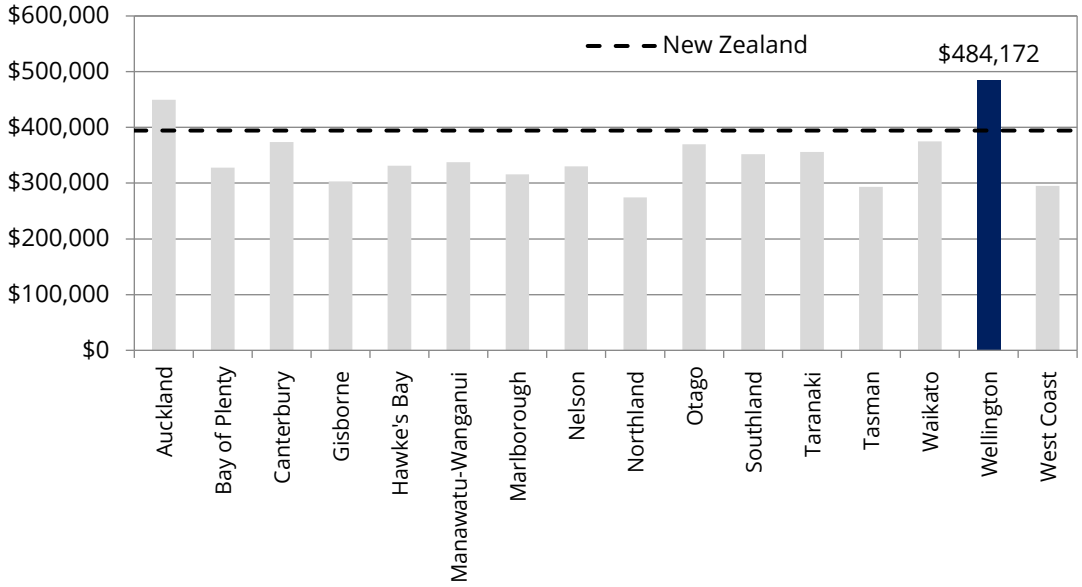
Part of the high-income story reflects a highly educated workforce. The average worker is more likely to have a tertiary qualification and more likely to have a higher degree than the rest of New Zealand. That improves estimates of human capital within the region (see Figure 4) that in turn generate higher wages.

Higher wages also attract workers to the region. Wellington is also New Zealand's second-most populous region. Put together with Wellington's highly skilled labour force, Wellington's labour market is *deep* – there are potentially many people that can do specialised roles (such as environmental engineering, cross-border taxation lawyers and designing graphics for the gaming industry). For firms operating in industries that drive the local economy, there are

simply more finance, government and IT workers in Wellington than most other regions. We expect these trends to continue and drive future demand for business land.

Deep labour markets help match firms and workers to jobs. With many jobs and workers in the labour market it also easier to shift jobs. When highly educated workers shift jobs, knowledge is shared and transferred to other workers, lifting productivity compared with other regions without such deep, highly connected labour markets.

FIGURE 4: HUMAN CAPITAL IS MUCH HIGHER IN THE CAPITAL REGION THAN OUTSIDE
Regional estimates of human capital



Source: Statistics New Zealand, Sense Partners

Firms in the Wellington region operate in complex industries

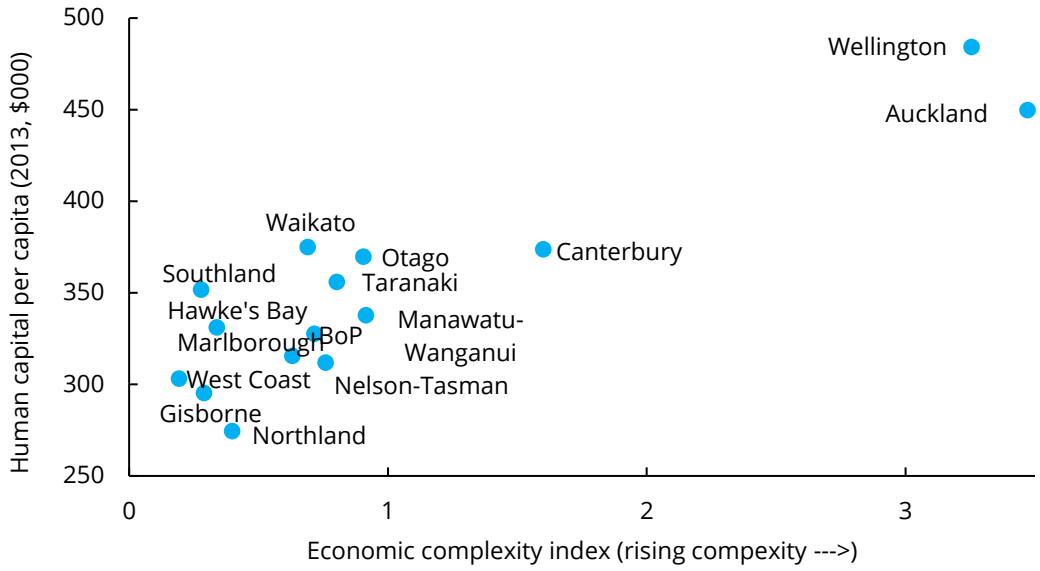
Deep labour markets help the Wellington region specialise and compete in complex industries. This helps determine the economic performance of the region. Regions have a suite of industries they compete in. Some regions exhibit a high degree of specialisation, operating in only a small chunk of the make-up of the national economy. Other regions are general and are composed of a little bit of the economic composition of the national economy.

Specialisation is an important component of a region's economic *complexity*, that is, the extent that a region provides a unique set of goods and services provided by no other region.[1] Complexity can help lift incomes since it helps provide a productivity premium relative to regions that produce similar goods and services to elsewhere. This helps lift the potential within a region, but the experience of Auckland and the Wellington region shows that while complexity can explain regions where incomes are high (see Figure 5), it is not necessarily a good predictor of which regions might be expected to grow strongly. Economic complexity can

[1] See Appendix 1 for details on how we calculate complexity.

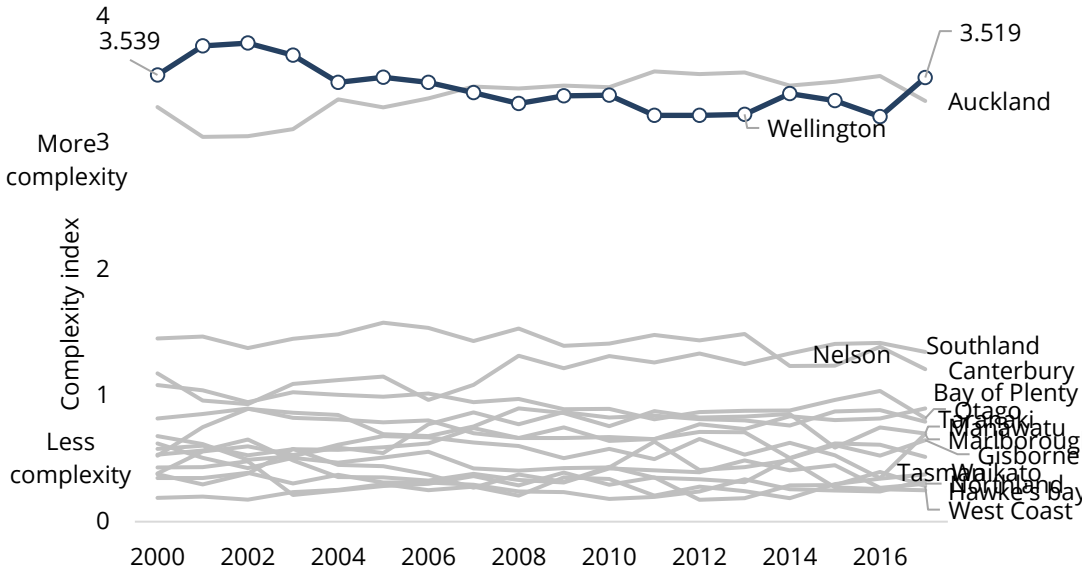
change over time. But our estimates show that the differences between Auckland and the Wellington region and the rest of New Zealand have persisted over many years (see Figure 6). Expect this trend to continue and help determine future business land demand.

FIGURE 5: ECONOMIC COMPLEXITY CAN HELP EXPLAIN WHERE INCOMES ARE HIGH
Economic complexity (2016) against human capital per capita (2013 census)



Source: Statistics New Zealand, Sense Partners

FIGURE 6: DIFFERENCES IN ECONOMIC COMPLEXITY PERSIST
Regional complexity estimates, 2000-2017

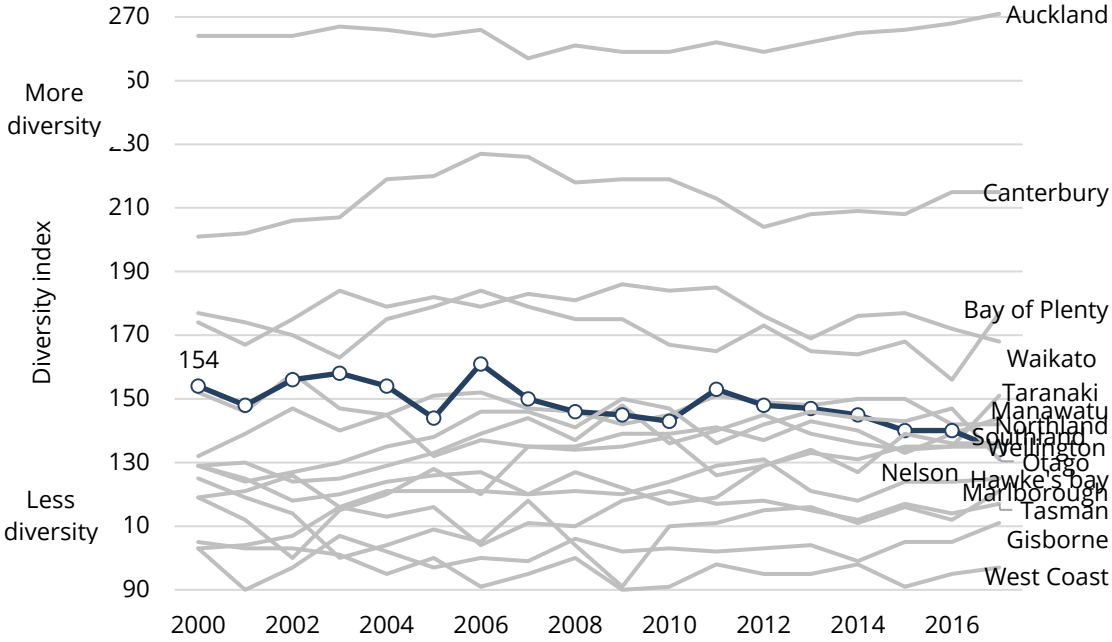


Source: Statistics New Zealand, Sense Partners

Our complexity measures are derived from employees counts that compare the number of sub-industries that exhibit specialisation, where the proportion of employees involved in that

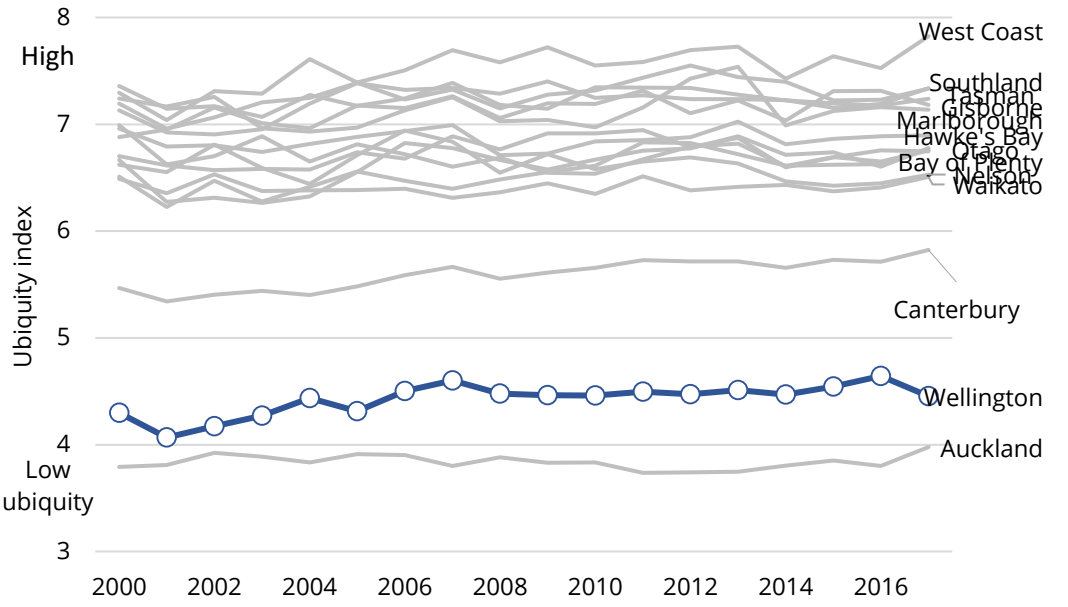
industry is higher than the national average, and ubiquity measures that compare specialisation across regions. Figure 7 and Figure 8 compare diversity and ubiquity across New Zealand (See Appendix 1 on how we measure diversity and ubiquity).

FIGURE 7: AUCKLAND'S PRODUCTIVE BASE IS MORE DIVERSE THAN OTHER REGIONS
Diversity measures, based on 6-digit ANZSIC industry employee counts



Source: Statistics New Zealand, Sense Partners

FIGURE 8: WELLINGTON AND AUCKLAND SPECIALISE IN MANY NICHE INDUSTRIES
Ubiquity measures, based on 6-digit ANZSIC industry employee counts



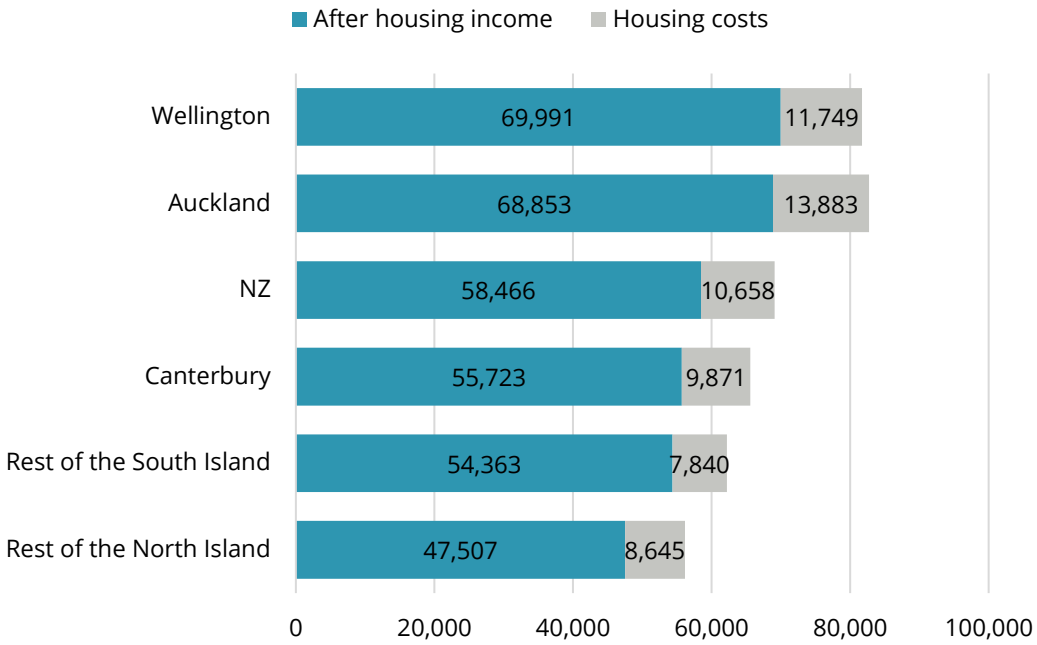
Source: Statistics New Zealand, Sense Partners

2.1.2 There is a competitive advantage but underperformance

Competitive advantage

Wellington's labour markets produce a competitive advantage for firms that locate within the region. Access to a deep pool of labour with high human capital helps provide an edge relative to businesses that operate from other regions. Workers are attracted by high incomes and housing costs that are more moderate than Auckland (see Figure 9), that make for high disposable income. This makes it easier for many service sector employers to access the labour they need and support the shift towards services across the region.

FIGURE 9: WELLINGTON HAS HIGH INCOMES AND MODERATE HOUSING COSTS
Income pre- and post-housing costs

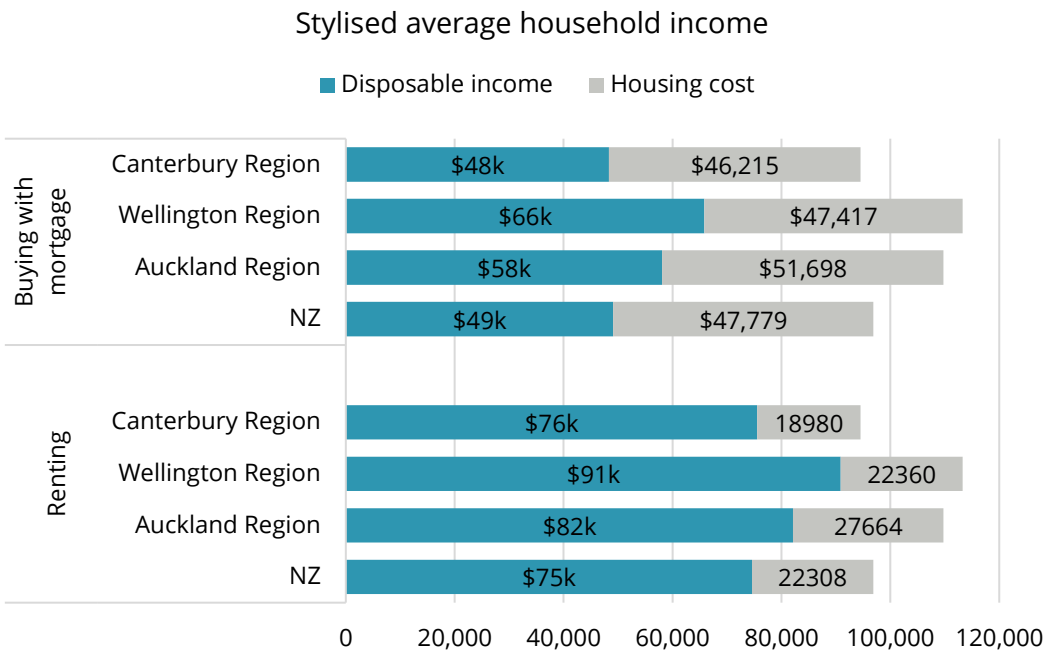


Source: Statistics New Zealand, Sense Partners

Figure 9 shows the powerful influence housing costs can have on a region's competitiveness. Housing costs reduce disposable incomes, eating away to the competitive advantage that can entice workers to a region. For Wellington, to maintain an edge, it is critical to keep housing costs lower than the Auckland region. This helps support the future population growth that drives demand for business land.

Housing costs are broader than the cost of purchasing a home. For many at the key age cohorts that support migration between New Zealand's regions, rental costs are critical. The cost and access to rental accommodation can be a key driver of attraction to locate within region. Figure 10 omits many important elements of decisions over housing (including quality, the cost of housing and the time cost, of travel) but at least for now, the cost of renting in the Wellington region is lower than in Auckland.

FIGURE 10: LOWER RENTS HELP WELLINGTON MAINTAIN AN EDGE OVER AUCKLAND
Household incomes, buying with mortgage compared to renting accommodation



Source: Statistics New Zealand, Sense Partners

Relative underperformance

While the region has a competitive advantage, growth has been lower than expected. To benchmark expectations, we decompose the average rate of economic growth for each council into three parts:

(i) what we might expect if the territorial authority grew at the average rate of economic growth observed (*the national growth rate*)

(ii) the growth rate based on the *industry specialisation* of each territory authority (expect rapid growth for regions with fast-growing industries)

(iii) a *competitiveness* effect, the residual that reconciles the local growth rate to the national growth rate adjusted for industry composition.

We use shift-share analysis to decompose growth in employment for each council into the three parts. Our results show that the region has tended to underperform.

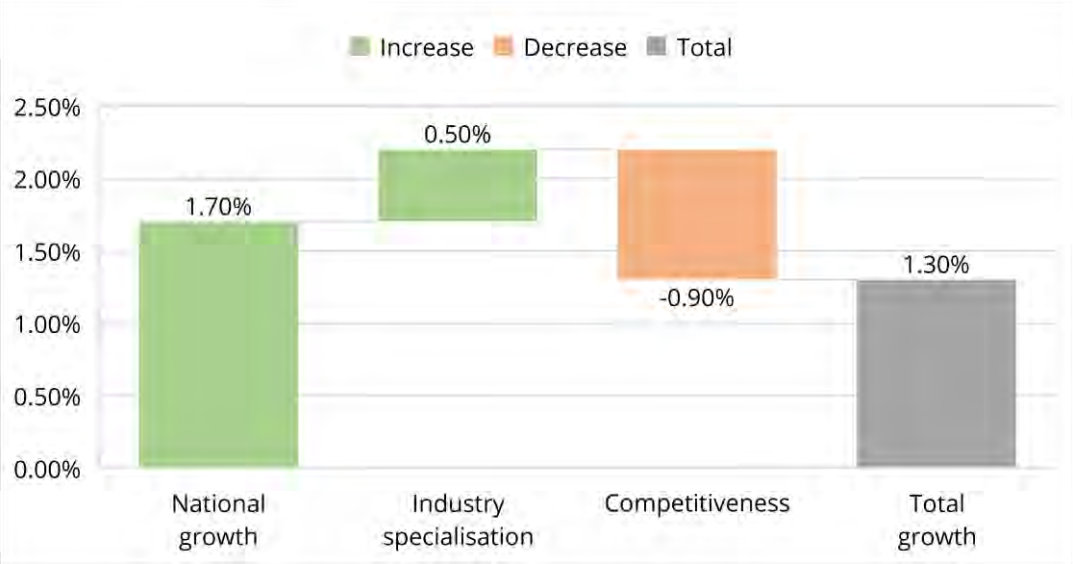
Employment in Wellington City has grown at 1.3 percent each year since 2000.[2] Employment nationally grew 1.7 percent over the same period (see Figure 11). Moreover, Wellington city is comprised of subindustries that tend to grow faster than elsewhere, so we should expect Wellington city to grow 0.5 percent more each year than the national average. Wellington city's

[2] Wellington city had just under 150,000 jobs in 2016 according to the Statistics New Zealand business demography database we use for our shift-share analysis.

poor performance implies that local competitiveness effects dragged half a percentage point from growth each year over the relevant period.

FIGURE 11: WELLINGTON CITY HAS UNDERPERFORMED

Wellington City, Shift-share analysis, employment totals, 2000-2016

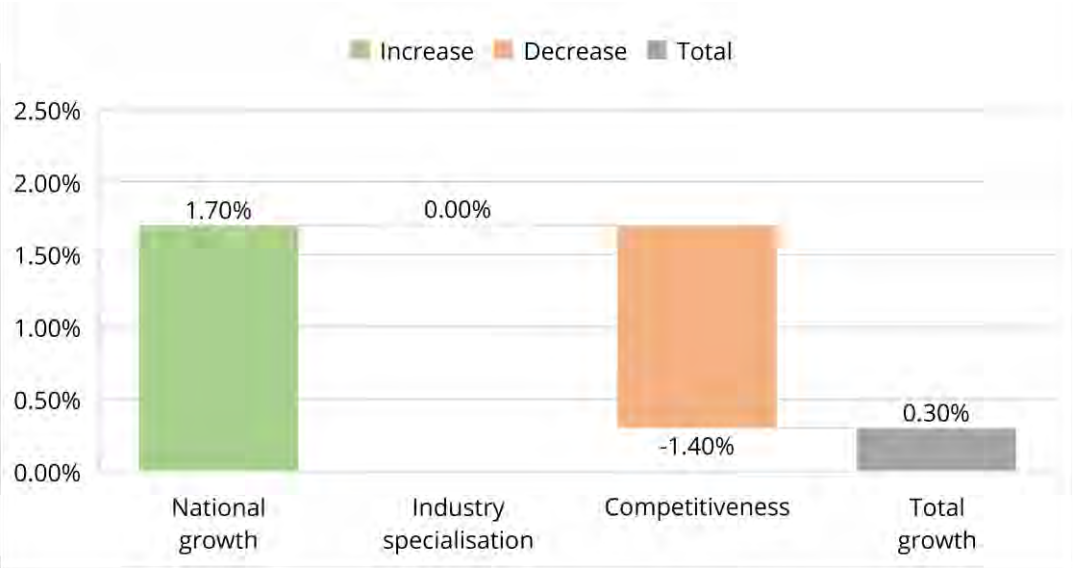


Source: Statistics New Zealand, Sense Partners

Figure 12 shows that Lower Hutt employment grew relatively slowly at 0.3 percent a year (adding 1,930 jobs between 2000 and 2016). The industry composition of the local economy was not particularly exposed or underrepresented by fast-growing industries. So, our analysis attributes the relatively slow rate of employment growth to local competitiveness factors likely to dampen future demand for business land.

FIGURE 12: LOWER HUTT HAS DECLINED FROM A LACK OF COMPETITIVENESS

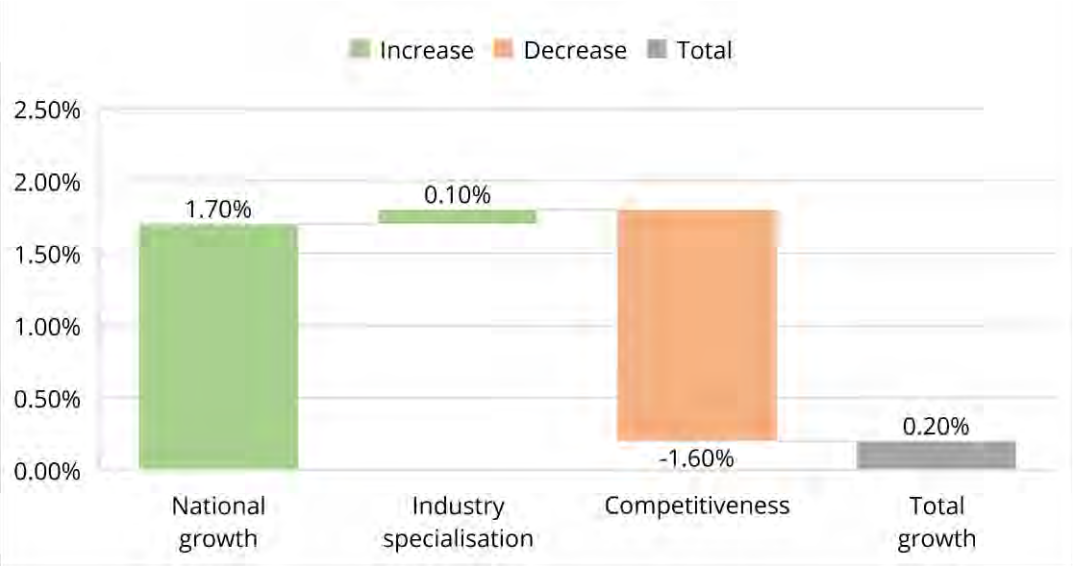
Lower Hutt, Shift-share analysis, employment totals, 2000-2016



Source: Statistics New Zealand, Sense Partners

Upper Hutt shows similar performance to Lower Hutt, growing only 0.20% a year between 2000 and 2016 – much weaker than the average national growth rate. Upper Hutt's industry composition is not particularly relevant for thinking about employment growth and we attribute the weak rate of growth to local underperformance.

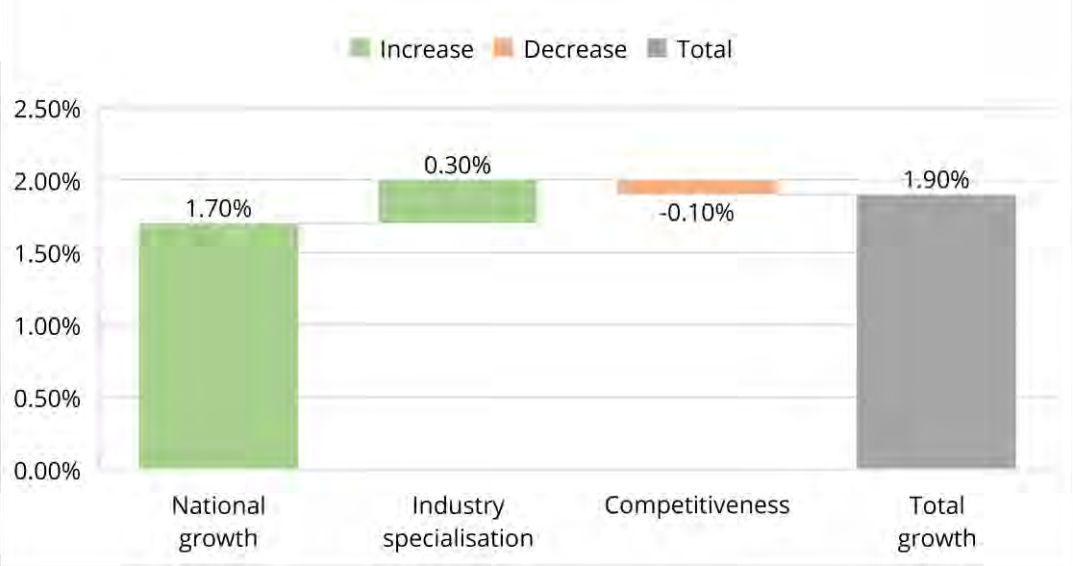
FIGURE 13: EMPLOYMENT IN UPPER HUTT EXPANDS ONLY SLIGHTLY
Upper Hutt, Shift-share analysis, employment totals, 2000-2016



Source: Statistics New Zealand, Sense Partners

Kapiti Coast's employment grew over the period, slightly outperforming the national average and posting 1.9 percent average growth over the period (see Figure 14). supporting future business activity and demand for land.

FIGURE 14: KAPITI POSTED SOLID EMPLOYMENT GROWTH
Kapiti Coast, Shift-share analysis, employment totals, 2000-2016

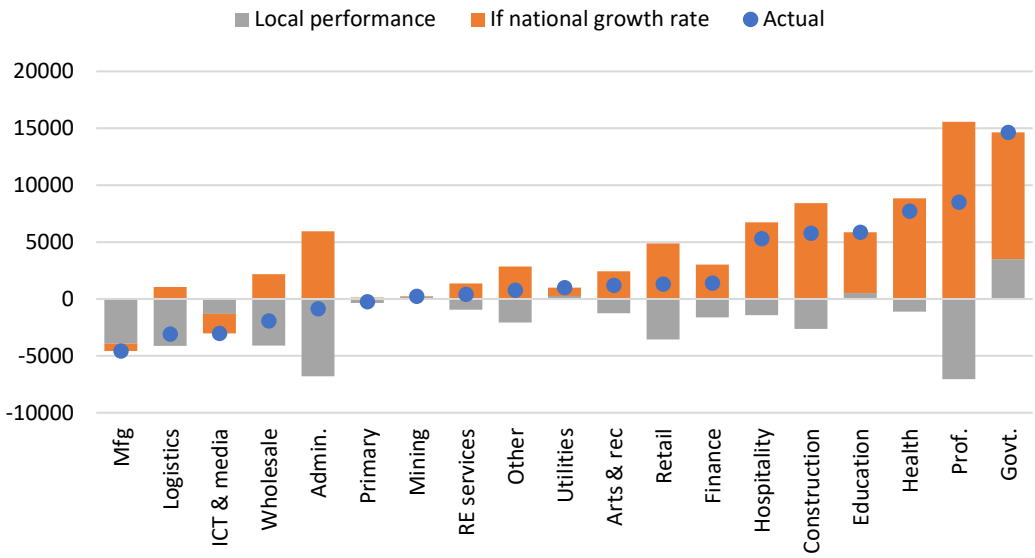


Source: Statistics New Zealand, Sense Partners

Kapiti Coast's industries are also slanted towards the faster growing industries, an effect we expect to grow employment by 0.3 percent each year. That impact implies that local competitiveness recorded for the Kapiti Coast pulled employment growth down a little (by 0.1 percent) over the period.

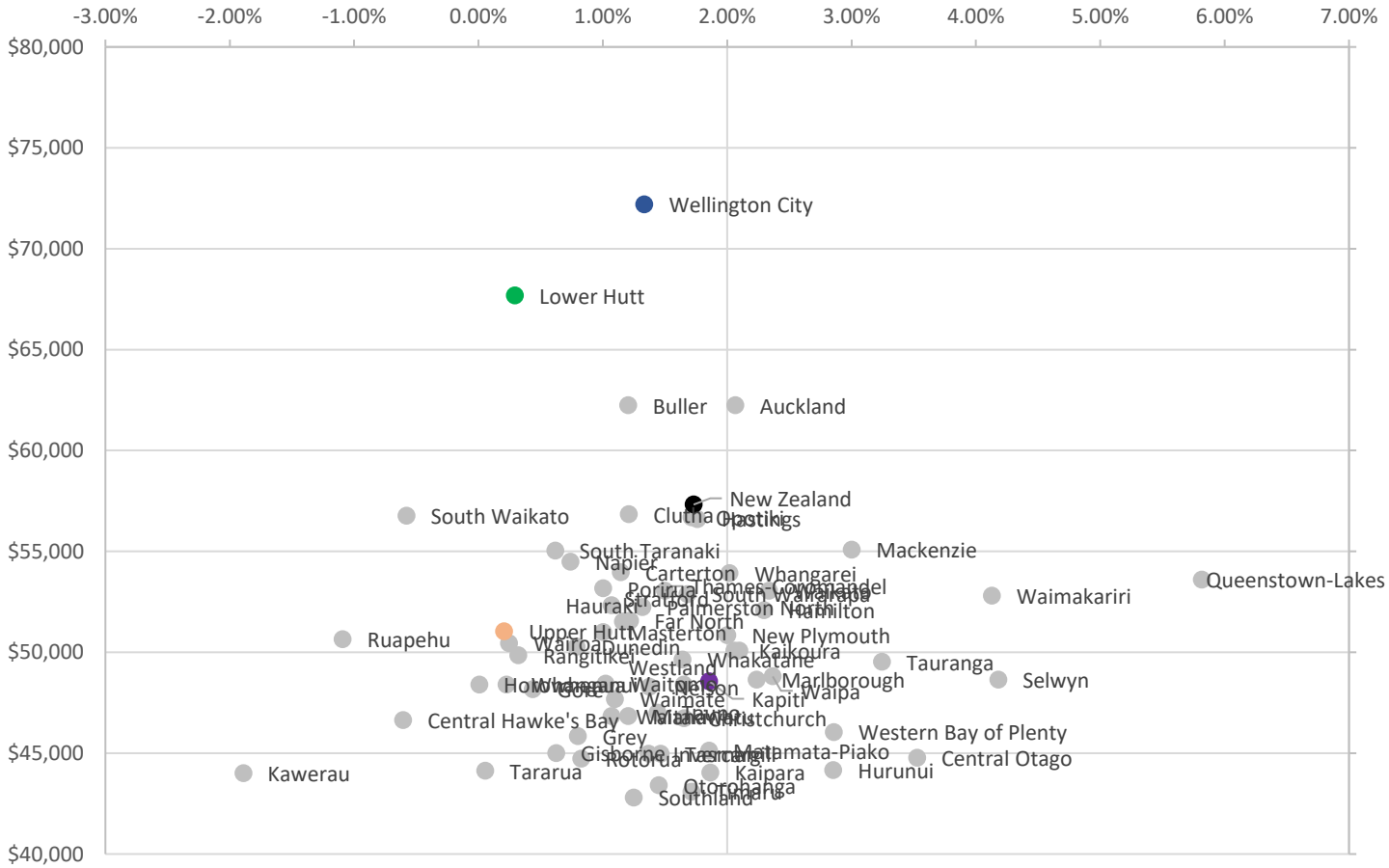
But across the region, performance was poor. Kapiti's average performance was more than offset by the weaker performance for Lower Hutt, Upper Hutt and Wellington City – that provides the lion's share of employment. We can also decompose this poor performance on an industry basis. Figure 15 shows that almost every industry, aside from government, contributed to lower growth than expected at a national level.

FIGURE 15: DECLINE ACROSS ALMOST ALL NON-GOVERNMENT INDUSTRIES
Additional jobs created due to regional performance premium, 2000-2017
Study area's employment growth decomposition



Source: Statistics New Zealand, Sense Partners

FIGURE 16: HIGH INCOMES RATHER THAN STRONG EMPLOYMENT GROWTH MAKE WELLINGTON STAND OUT

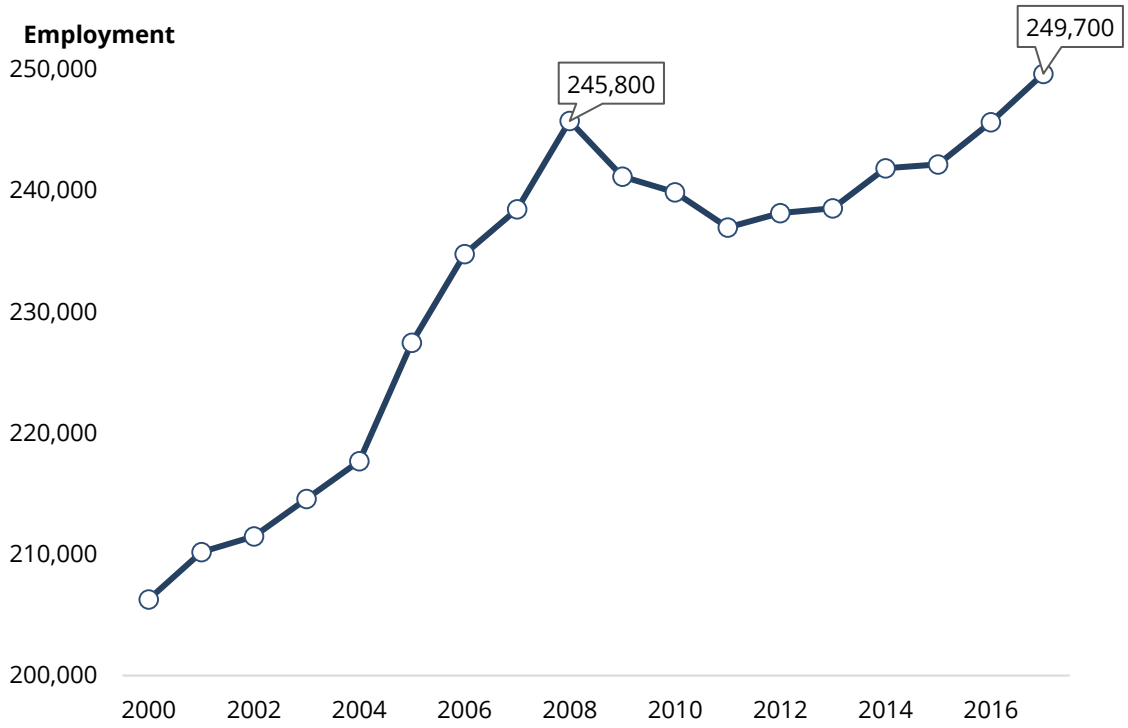


Source: Statistics New Zealand, Sense Partners

The GFC cast a long shadow

One of the defining features of the past 10 years is the impact of the Global Financial Crisis on local labour markets. The crisis had a severe impact on most advanced economies. New Zealand was not immune, and many regions experienced long periods of elevated unemployment rates. Figure 17 shows that for the Wellington region the GFC had a marked effect – only in 2017 did the level of employment return to its pre-GFC peak.

FIGURE 17: EMPLOYMENT HAS ONLY JUST REACHED THE PRE-GFC PEAK
Wellington region, Employee Count, Business Demography Database

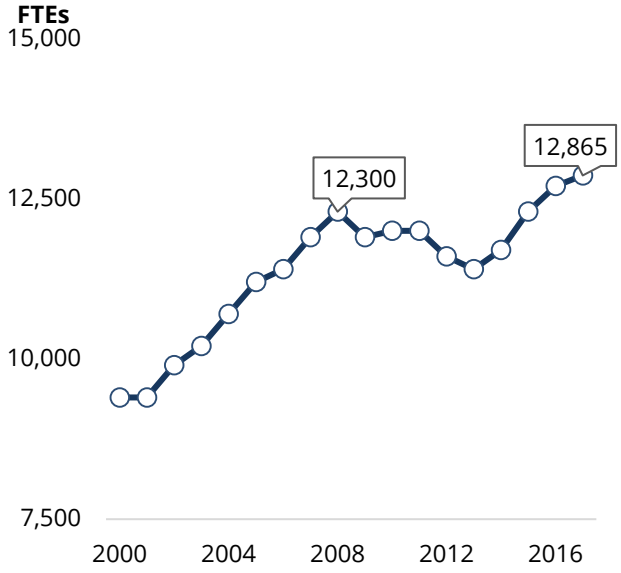


Source: Statistics New Zealand

Lower Hutt and Upper Hutt were hit particularly hard – neither region has seen employment return to the pre-GFC peak (see Figure 19 and Figure 20). In contrast, Wellington city shows only a modest fall in employment that is offset by job growth by 2014. Kapiti Coast was also a little less effected by the GFC. These trends help shape the demand for floorspace.

FIGURE 18: EMPLOYMENT: KAPITI COAST

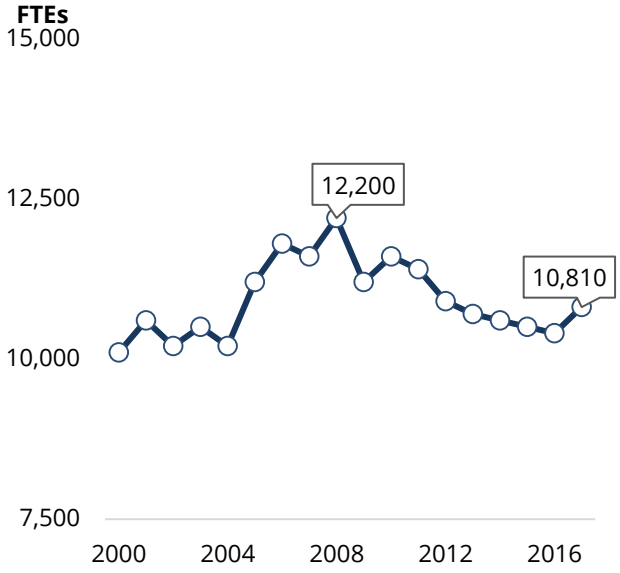
Kapiti Coast Employees, SNZ Business Demography



Source: Statistics New Zealand

FIGURE 19: EMPLOYMENT: UPPER HUTT

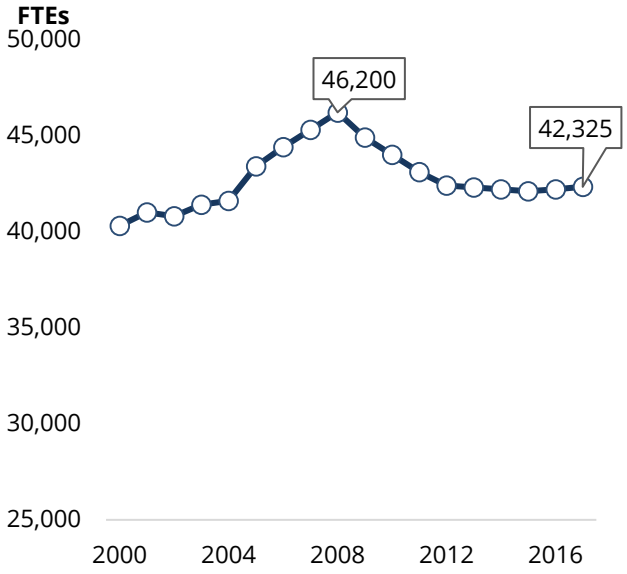
Upper Hutt Employees, SNZ Business Demography



Source: Statistics New Zealand

FIGURE 20: EMPLOYMENT: LOWER HUTT

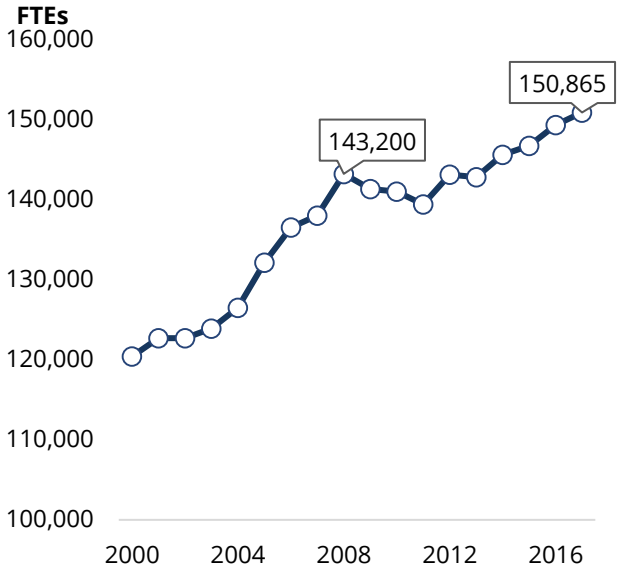
Lower Hutt Employees, SNZ Business Demography



Source: Statistics New Zealand

FIGURE 21: EMPLOYMENT: WELLINGTON CITY

Wellington City Employees, SNZ Business Demography



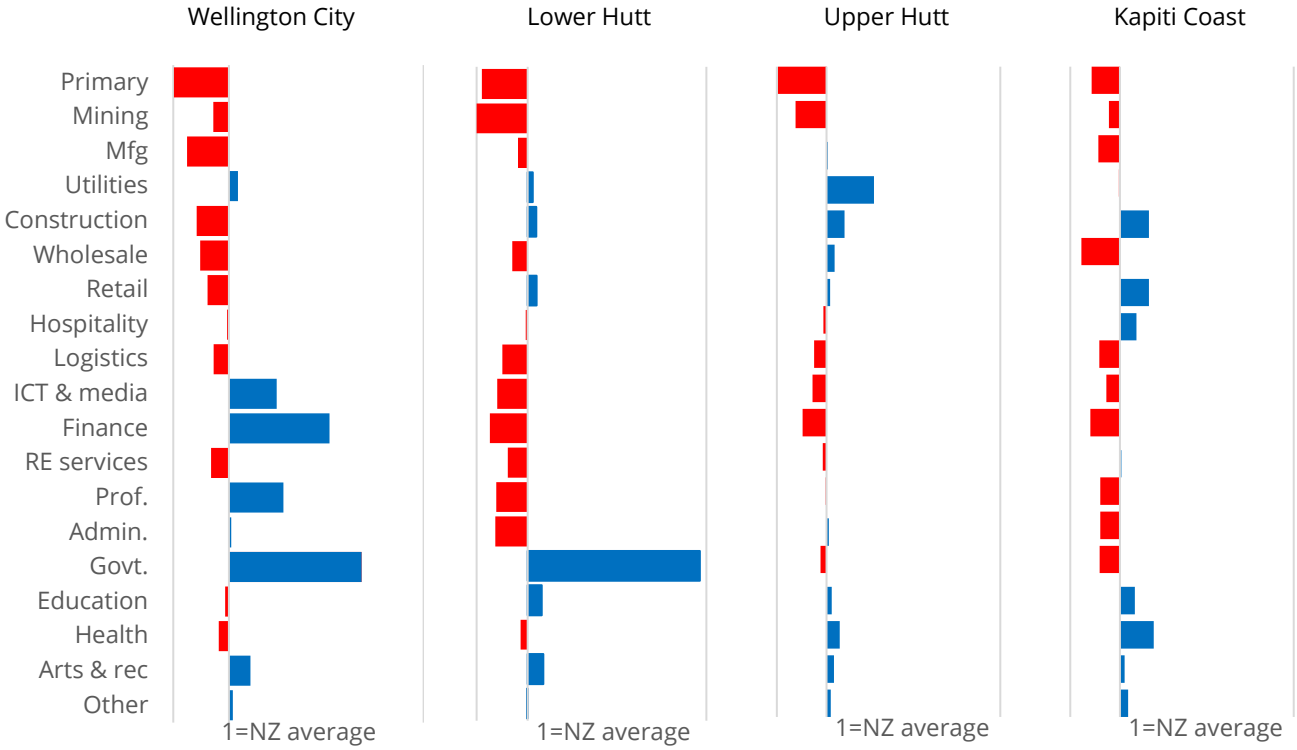
Source: Statistics New Zealand

2.1.3 Expect the Government sector to grow

At least part of the relative strength of the recovery from the GFC in Wellington city relates to the role of the Government sector. Without exposure to the manufacturing industries that characterise both Lower Hutt and Upper Hutt employment (see Figure 22), employment fell only modestly. Figure 22 shows starkly just how important the government is for the local economy – almost all industries show decline except for government roles.

FIGURE 22: GOVERNMENT IS CRITICAL FOR THE REGION

Performance of local industry, 2000-2017, additional jobs created relative to NZ average



Source: Statistics New Zealand, Sense Partners

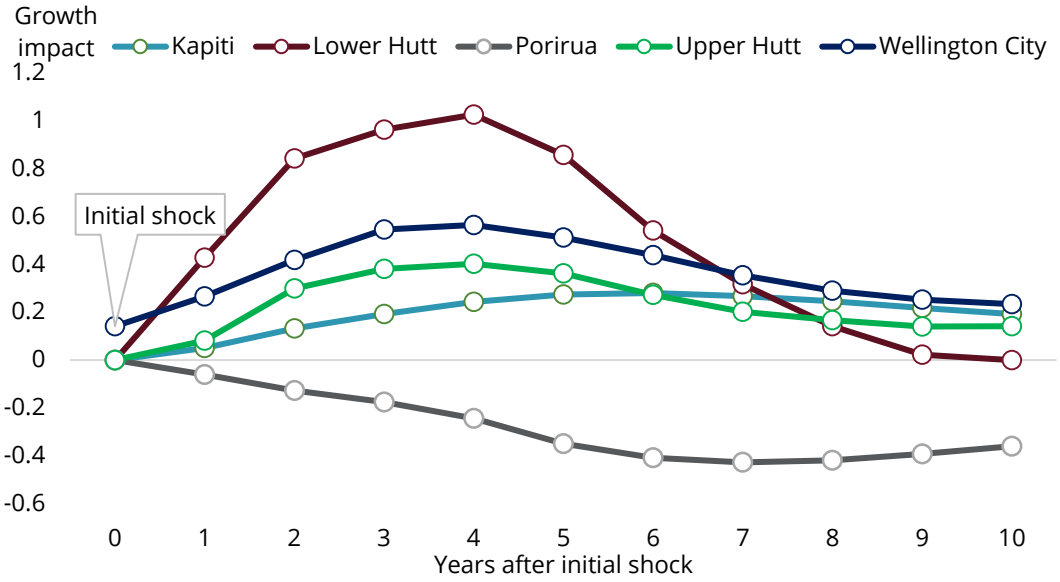
2.1.4 Local complementarities exist

Outside of the role of the government sector, one of the key drivers of activity at the local level are the interactions across the territory authorities. When activity lifts in one part of the region, other territory authorities are brought along for the ride. Conversely, when activity falters, expect spill-overs to other areas to slow economic growth.

To show some of these interactions, we developed a simple model of economic activity within the Wellington region based on employment growth in five local territory authorities (Wellington City, Lower Hutt, Upper Hutt, Kapiti Coast and Porirua City).

Our model maps the growth interactions across the five local authorities from 2000 to 2017. In Figure 23 we show how a shock to economic growth in Wellington City resonates through Wellington City and the other authorities. The shock peaks four years after the initial shock.

FIGURE 23: SOME BUT NOT ALL LOCAL AUTHORITIES ARE TIED TO WELLINGTON CITY
One standard deviation shock to employment growth in Wellington City



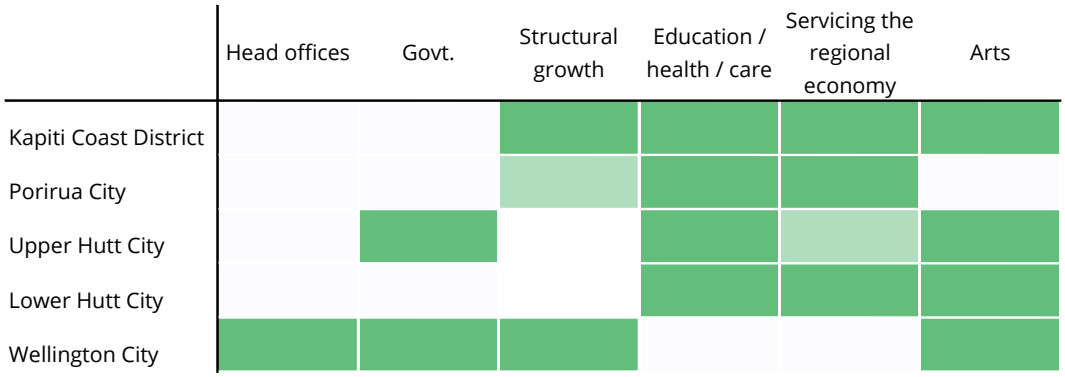
Source: Statistics New Zealand, Sense Partners

Lower Hutt appears closely tied to Wellington and lifts significantly in response to the initial shock – responding even more strongly than the local Wellington City economy. Upper Hutt is strongly tied to Wellington City and the Kapiti Coast also lifts in response to stronger activity in Wellington City. Porirua moves in the opposite direction – employment declines in response to stronger growth in Wellington City.[3] This suggests bundling Wellington City, Lower Hutt, Upper Hutt and Kapiti Coast together captures the central dynamic at play within the region.

The spill-overs shows complementarities across the local councils. These complementarities have their origins in how local firms interact to produce goods and services. Each district has their own specialisations. For example, the government sector locates in Wellington City and Upper Hutt with health, education and aged-care tending to be based in local authorities outside Wellington City. Figure 24 shows a stylised representation of the complementarities.

[3] Porirua has different demographics compared with Wellington city, has ties to economic activity to the north and will have its own growth drivers (including property development).

FIGURE 24: COMPLENTARITIES EXIST ACROSS THE LOCAL ECONOMY
Stylised representation



Source: Statistics New Zealand, Sense Partners

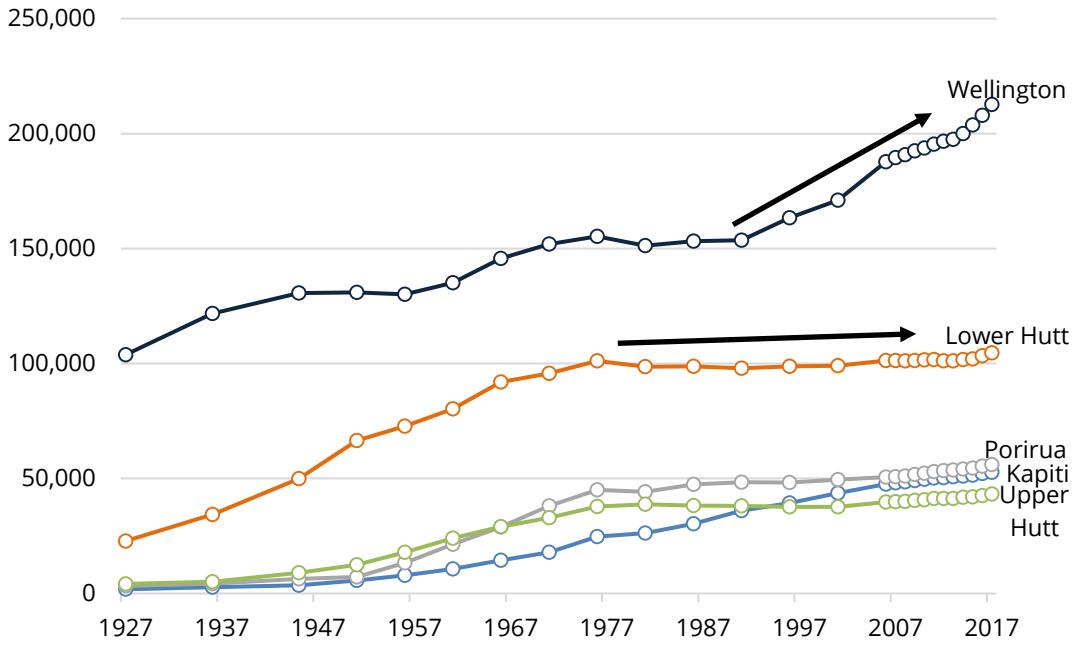
2.2 Demographics

2.2.1 Population is the key driver of local demand

Population growth, and demographic trends more broadly, are crucial for determining activity in local economies. Demographic trends will influence demand trends and growth potential, especially via life-cycle effects. But population growth is key for driving economic growth.

Figure 25 shows the populations of the local region over a 90-year time frame

FIGURE 25: SUB-REGIONS SHOW PERIODS OF GROWTH AND PERIODS OF STAGNATION
Population, 1927-2017



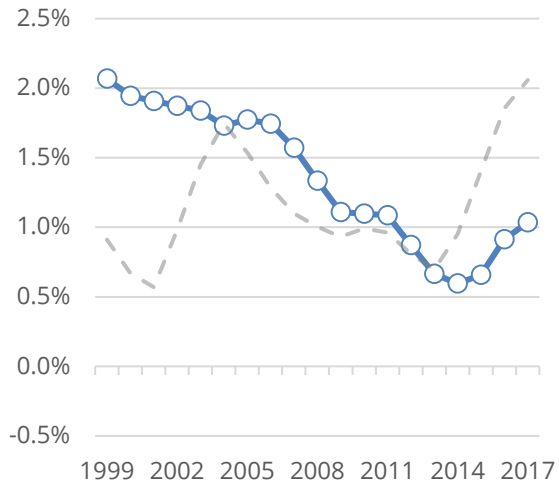
Source: Statistics New Zealand

Lower Hutt, Upper Hutt and Porirua grew rapidly prior to the 1970s but have moved sideways over more recent decades. Growth in Wellington City accelerated from the early 1990s. The Kapiti Coast continues to grow at a persistent rate off a low base population.

Knowing how local populations have developed relative to national trends is informative for thinking about future activity growth. Figure 26 to Figure 29 show that recent population increases in Wellington city tightly reflect national population growth while growth rates for Lower Hutt and Upper Hutt have been well below national population growth. Population growth in Kapiti has moderated relative to the pace of population growth at the national level.

FIGURE 26: KAPITI COAST DECLINING TREND

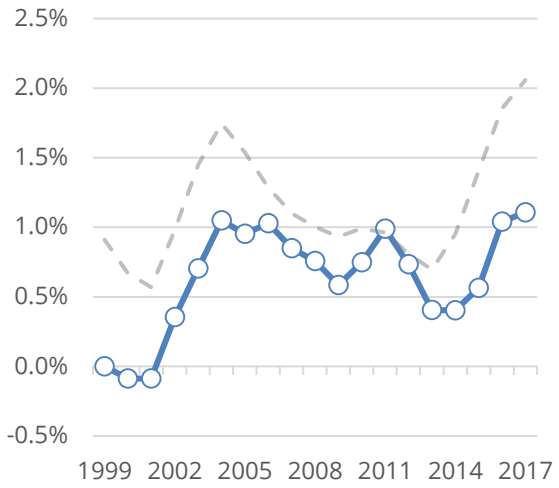
Kapiti Coast relative to New Zealand



Source: Statistics New Zealand

FIGURE 27: UPPER HUTT BELOW AVERAGE

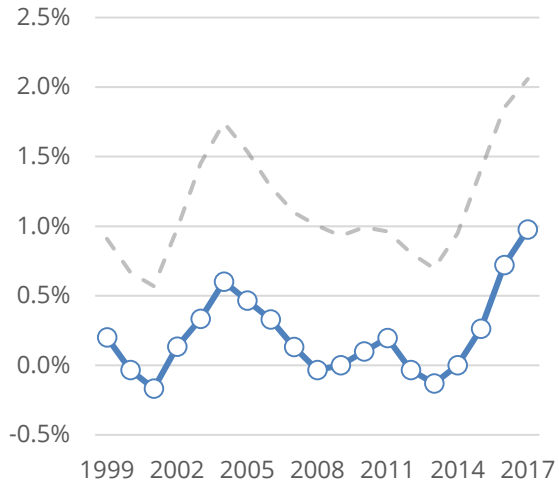
Upper Hutt relative to New Zealand



Source: Statistics New Zealand

FIGURE 28: LOWER HUTT BELOW AVERAGE

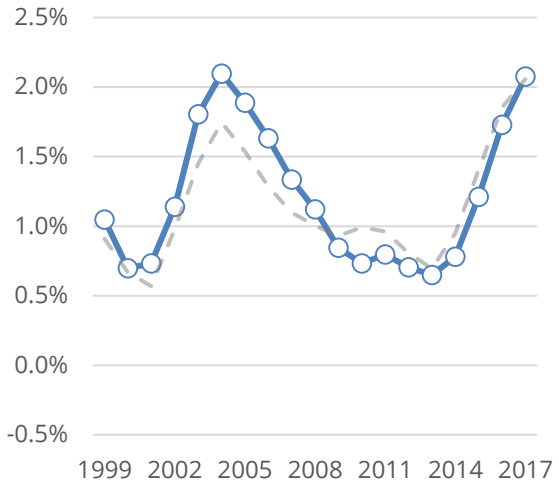
Lower Hutt relative to New Zealand



Source: Statistics New Zealand

FIGURE 29: WELLINGTON CITY LIKE NZ GROWTH

Wellington City relative to New Zealand

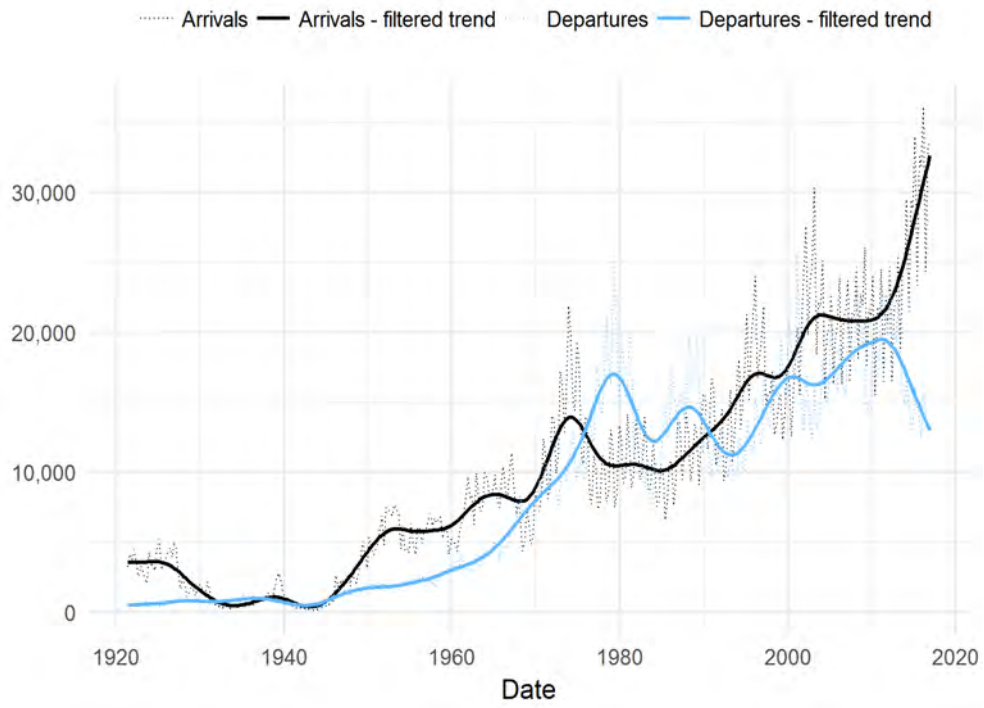


Source: Statistics New Zealand

So, knowing what might happen with population growth at the national level can help inform the population growth we could expect for Wellington city. For other districts we might expect slightly more moderate population growth.

At a national level, it turns out there are very good reasons to expect strong population growth to persist. Figure 30 shows trends for both arrivals and departures. Rather than settling at a number of immigrants per year, arrivals shows a clear upward trend that dates back to the second world war.

FIGURE 30: EXPECT STRONG MIGRATION-BASED POPULATION GROWTH TO CONTINUE
Performance of local industry, 2000-2017
Additional jobs created due to regional performance premium



Source: Statistics New Zealand, Sense Partners

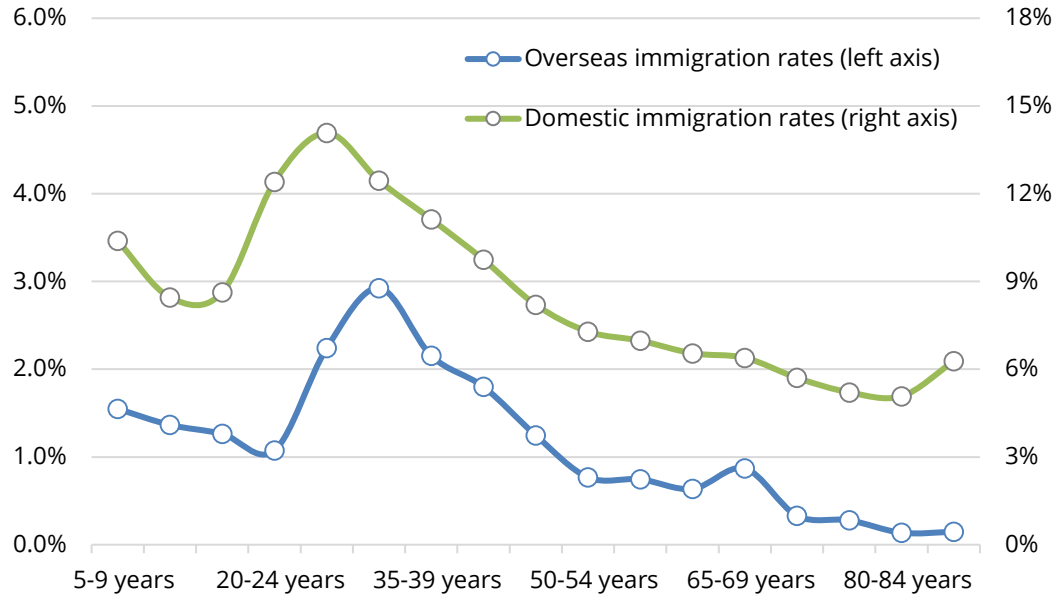
This upward trend is supported by a global population that is growing more quickly than the domestic population and an urbanisation process that means the pool of potential migrants, with the economic capital to move to New Zealand, continues to grow. Future arrivals are closely tied to the propensity of the growing pool of potential migrants rather than a fixed number of arrivals per year.

Figure 30 shows that departures from New Zealand have declined over recent years, exacerbating the increase in migration led population growth. The decline in departures is related to factors that include: (i) the reduced demand for labour in Australia after the moderation in the commodity boom; (ii) tightening of immigration policies in countries with traditional ties to New Zealand such as the UK; and (iii) the relative strength of the domestic economy in recent years. We expect the strength of some of these factors to wane, but migration is still likely to be supportive of robust population growth in the next ten years.

The life-cycle can also help determine local migration impacts. Figure 31 to Figure 34 show how migrants at different points in the life cycle can be attracted to particular regions. Older domestic migrants are more attracted to the Kapiti Coast than Wellington City while Wellington City attracts younger cohorts from both domestic and international locations.

FIGURE 31: KAPITI ATTRACTS OLDER DOMESTIC MIGRANTS

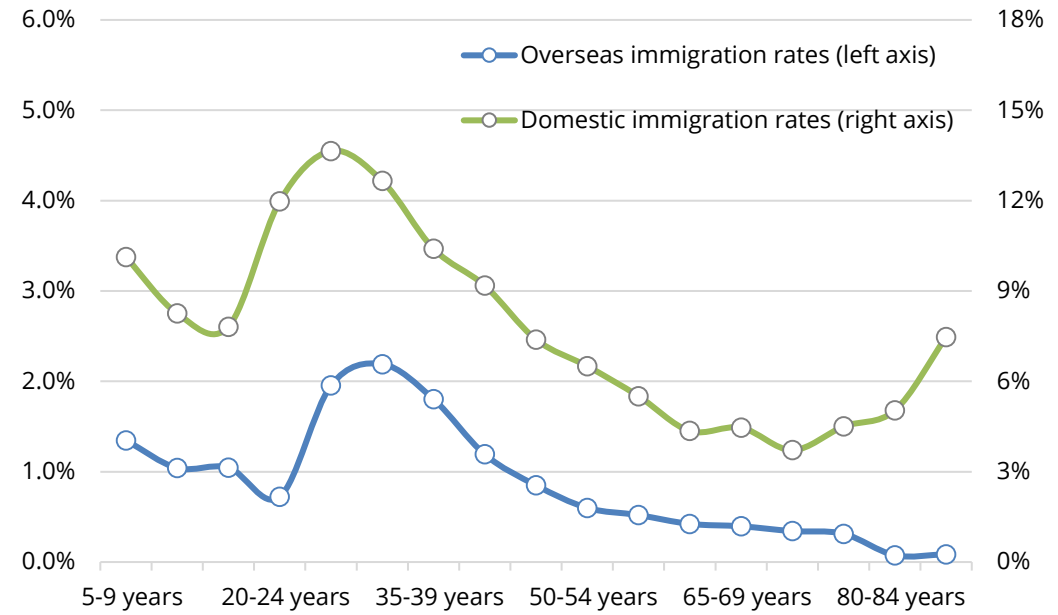
Rates of migration by age, Kapiti Coast, average across 2001,2006 and 2013 census



Source: Statistics New Zealand, Sense Partners

FIGURE 32: UPPER HUTT ALSO ATTRACTS OLDER DOMESTIC MIGRANTS

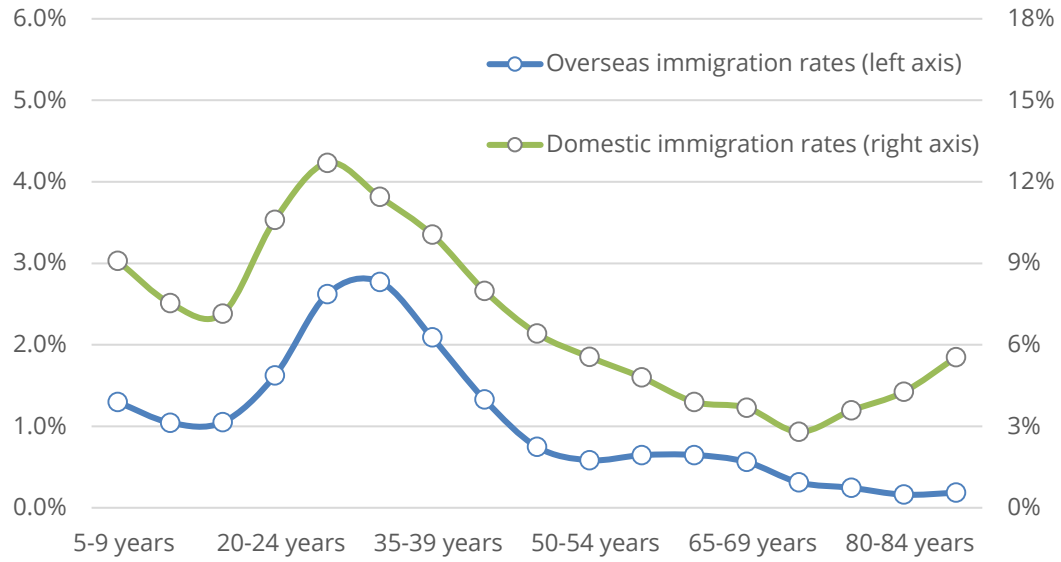
Rates of migration by age, Upper Hutt, average across 2001,2006 and 2013 census



Source: Statistics New Zealand, Sense Partners

FIGURE 33: MIGRATION: TO LOWER HUTT HAS A RELATIVE BROAD AGE BASE

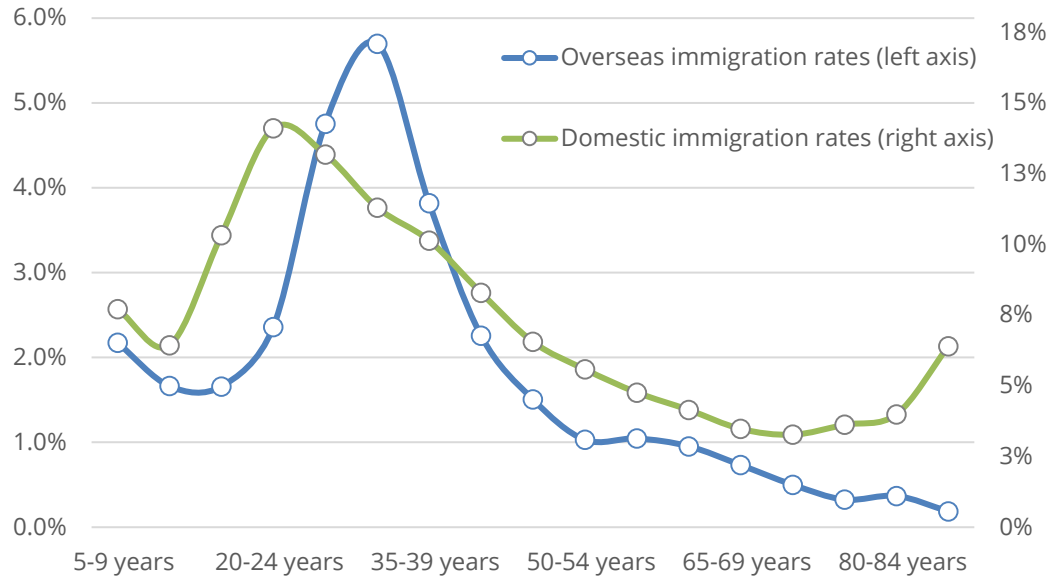
Rates of migration by age, Lower Hutt, average across 2001,2006 and 2013 census



Source: Statistics New Zealand, Sense Partners

FIGURE 34: WELLINGTON CITY ATTRACTS YOUNGER COHORTS

Rates of migration by age, Wellington city, average across 2001,2006 and 2013 census

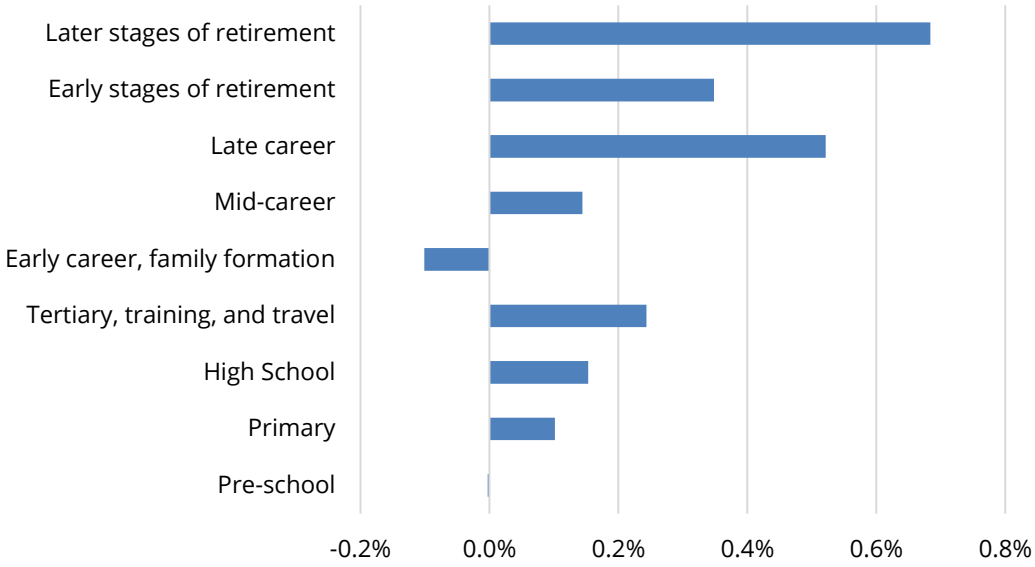


Source: Statistics New Zealand, Sense Partners

2.2.2 The life-cycle also helps determine local effects

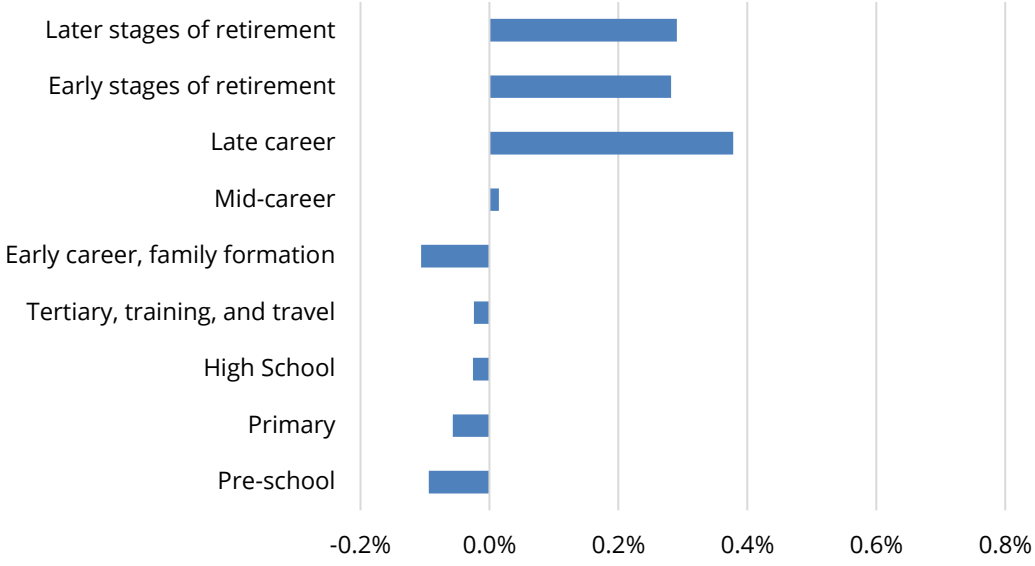
The stage of the life-cycle can determine population growth within local areas. Figure 35 shows that population growth on the Kapiti Coast is driven by strong growth in the late career and retirement stage of the life cycle. For Lower Hutt, growth in these older cohorts offsets population decline in younger cohorts.

FIGURE 35: RETIREMENT EFFECTS BOOST THE KAPITI COAST POPULATION
Life-cycle stages, Kapiti Coast, % contribution to growth, average of 2001, 2006, 2013 censuses



Source: Statistics New Zealand, Sense Partners

FIGURE 36: RETIREMENT OFFSETS DECLINING YOUNGER COHORTS FOR LOWER HUTT
Life-cycle stages, Lower Hutt, % contribution to growth, average of 2001, 2006, 2013 censuses

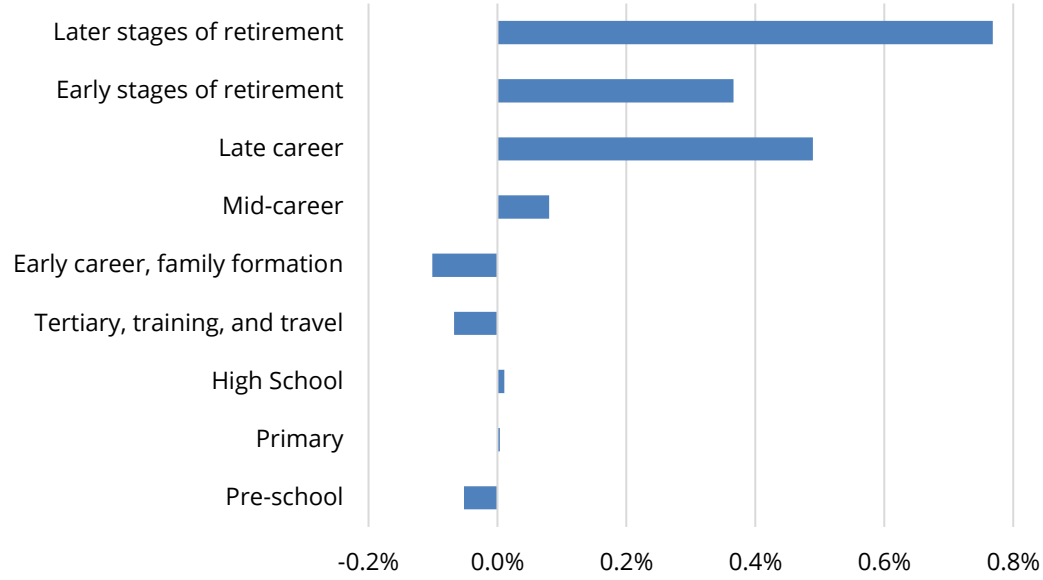


Source: Statistics New Zealand, Sense Partners

The retirement stage also helps boost the population in Upper Hutt. Population growth in Wellington City is much more broad-based, attracting growth in almost all the adult life-stages.

FIGURE 37: AGEING COHORTS DRIVE UPPER HUTT POPULATION DYNAMICS

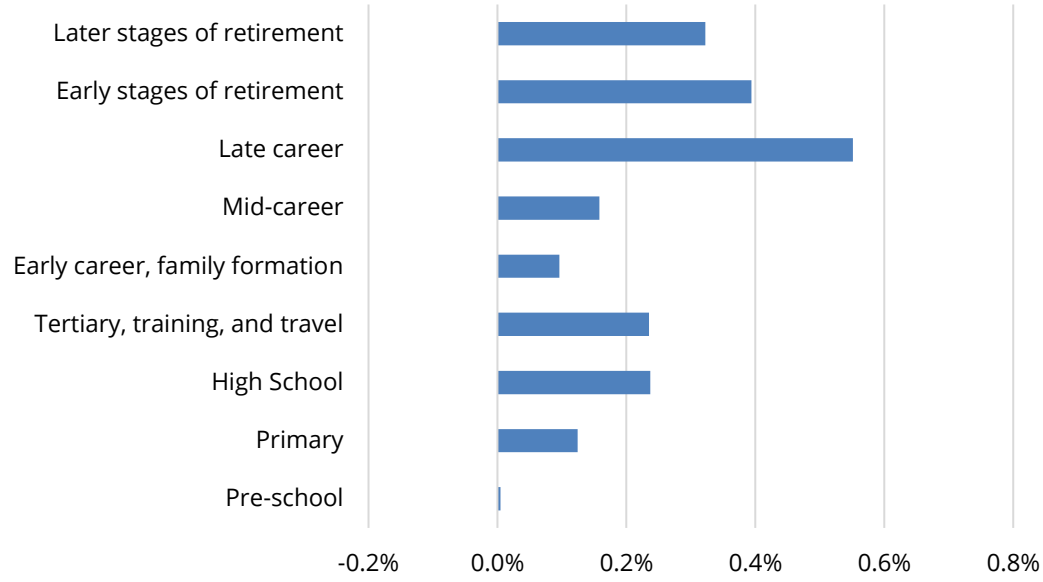
Life-cycle stages, Upper Hutt, % contribution to growth, average of 2001, 2006, 2013 censuses



Source: Statistics New Zealand, Sense Partners

FIGURE 38: WELLINGTON CITY'S POPULATION GROWTH IS BROAD-BASED

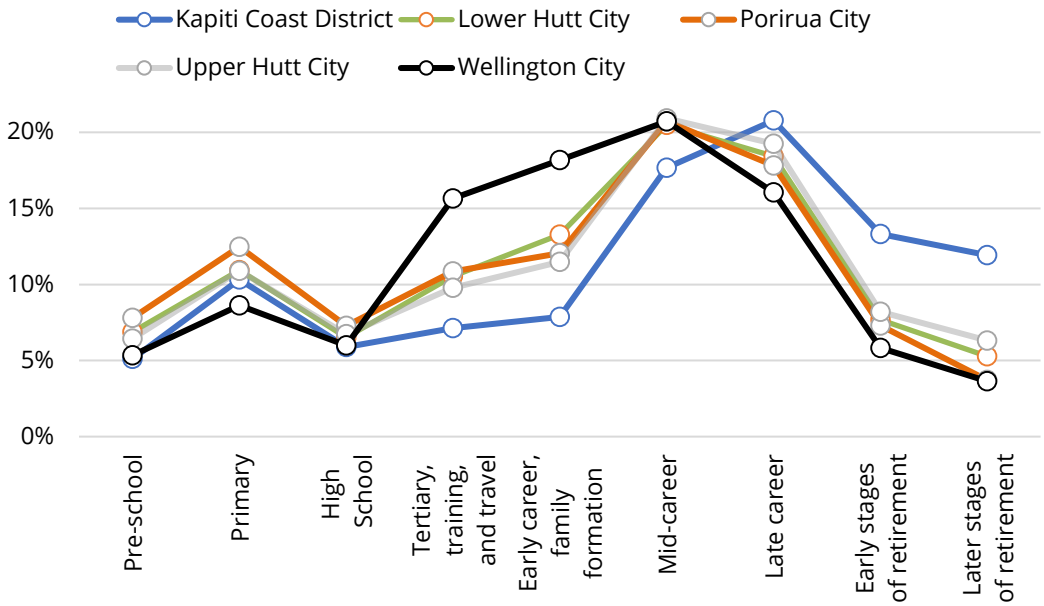
Life-cycle stages, Wellington City, % contribution to growth, ave. of 2001, 2006, 2013 censuses



Source: Statistics New Zealand, Sense Partners

These life-style effects also drive the interdependencies across the region (see Figure 39).

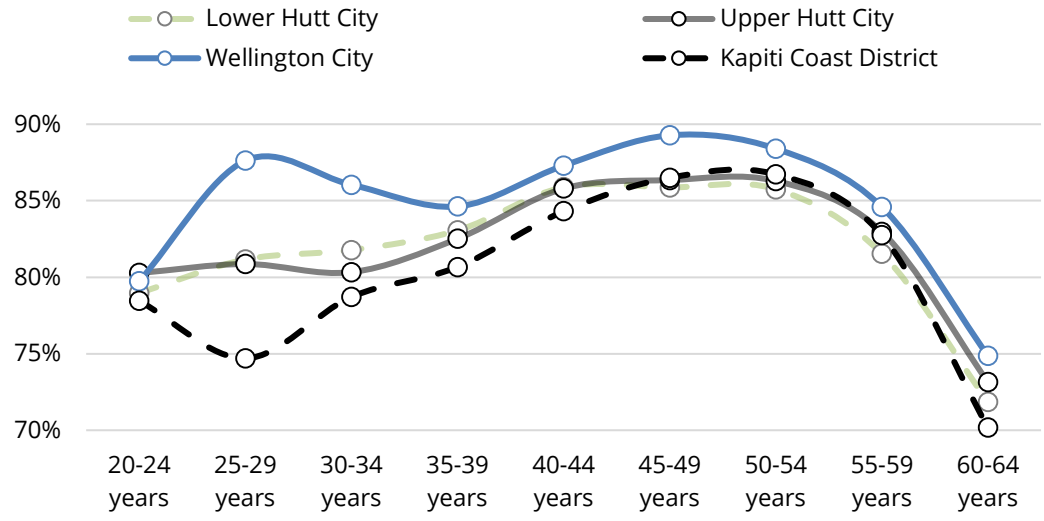
FIGURE 39: POPULATION SHARES BY AGE REFLECT COMPLEMENTARITIES
Additional jobs created due to regional performance premium



Source: Statistics New Zealand, Sense Partners

But care must be taken when interpreting the relationship between economic activity and population growth. If we expect productive workers to choose to locate in areas most likely to support higher wages, then economic activity can be driven higher by the sorting of high productivity workers into regions rather than any local growth dynamics. Wellington city's high labour force participation in prime working ages is consistent with high productivity workers moving in to the area (Figure 40).

FIGURE 40: SORTING EFFECTS DRIVE WELLINGTON CITY'S HIGH LABOUR FORCE PARTICIPATION RATE WITH MANY PRODUCTIVE WORKERS MOVING TO THE CITY
Labour Force Participation by age and Territory Authority

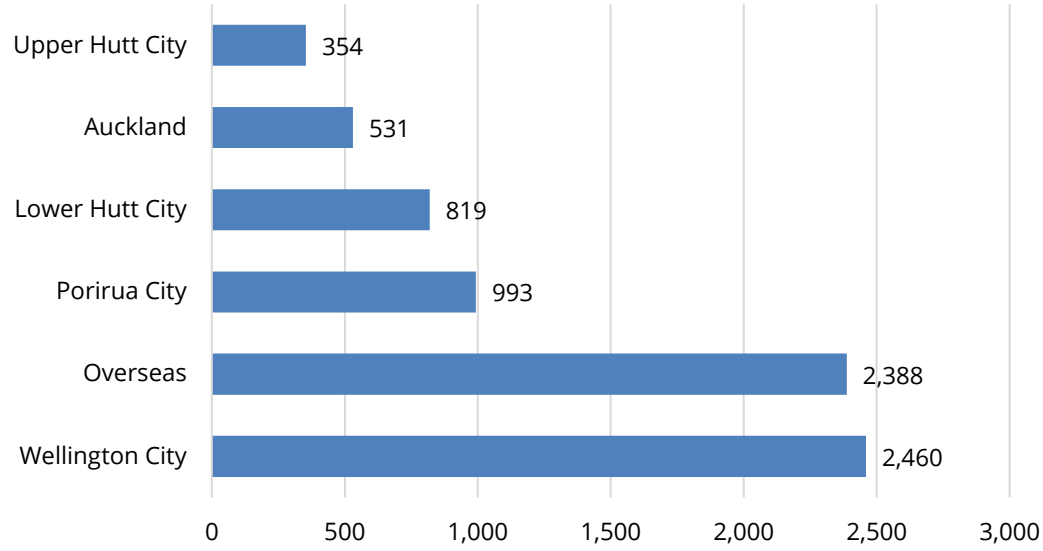


Source: Statistics New Zealand, Sense Partners

2.2.3 Wellington city has important push-pull impacts

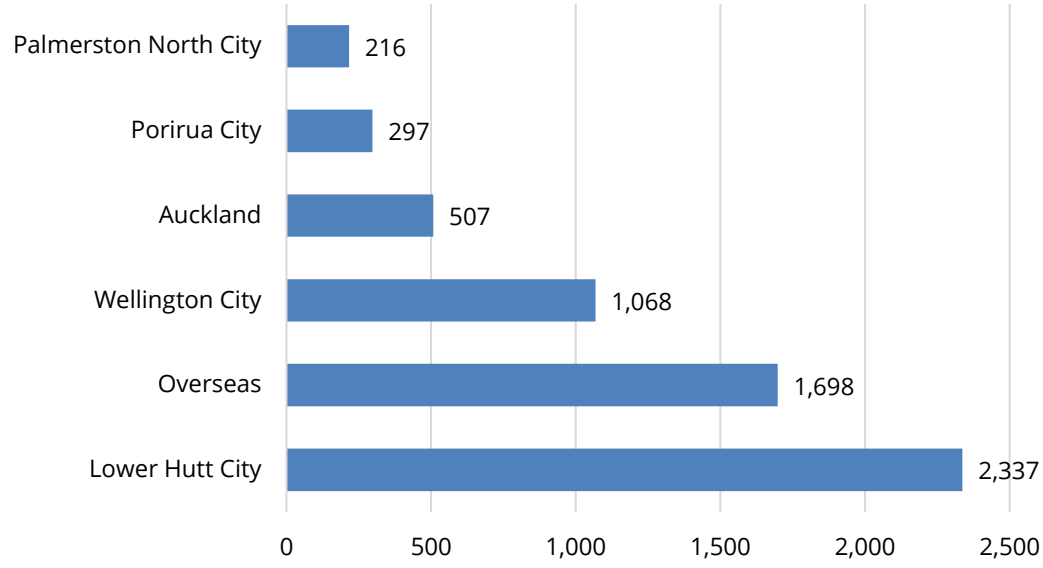
Wellington's urban base plays a strong role as the core of the region with other territorial authorities acting in the periphery of a core-periphery dynamic. Wellington city is the source of much of the migration growth for the periphery including the Kapiti Coast (see Figure 41), Upper Hutt (see Figure 42), and Lower Hutt (Figure 43). Wellington city in turn draws international migrants to the region.

FIGURE 41: KAPITI DRAWS MANY MIGRANTS FROM WELLINGTON CITY
Kapiti Coast migration sources, 2013 Census, 5-year period



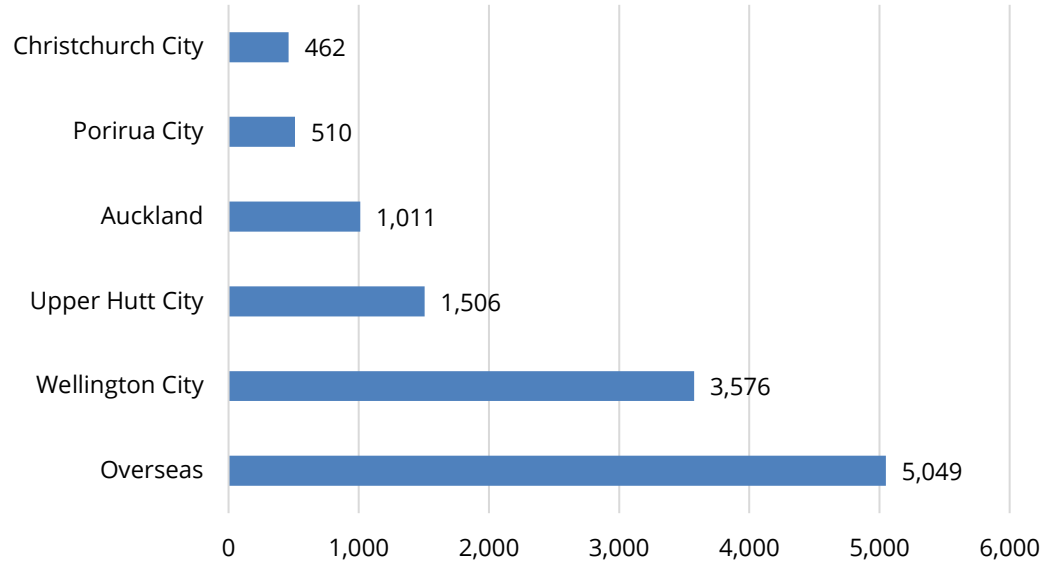
Source: Statistics New Zealand

FIGURE 42: UPPER HUTT ALSO ATTRACTS MIGRANTS FROM WELLINGTON CITY
Upper Hutt migration sources, 2013 Census, 5-year period



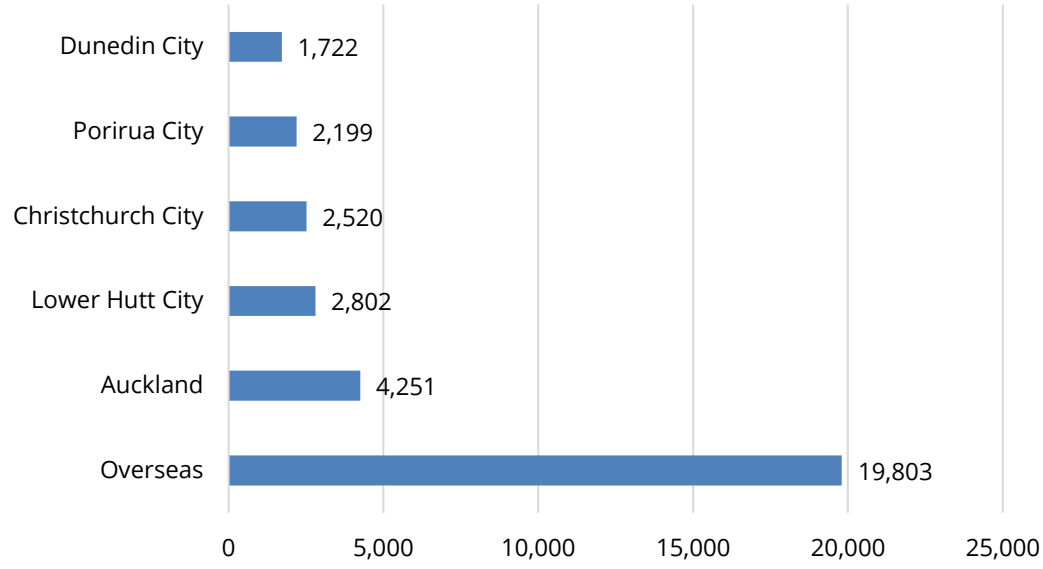
Source: Statistics New Zealand, Sense Partners

FIGURE 43: WELLINGTON CITY PROVIDES LOWER HUTT WITH MIGRANTS
Lower Hutt migration sources, 2013 Census, 5-year period



Source: Statistics New Zealand, Sense Partners

FIGURE 44: WELLINGTON CITY ATTRACTS INTERNATIONAL MIGRANTS
Wellington City migration sources, 2013 Census, 5-year period



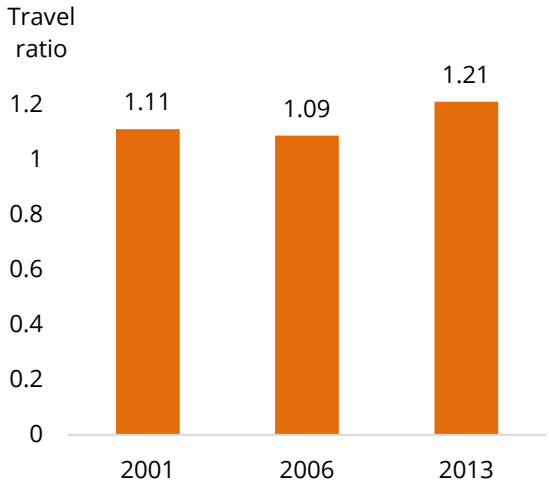
Source: Statistics New Zealand, Sense Partners

Part of the attraction of Wellington city is the compactness of the urban area. Relative to the rest of New Zealand, there are more jobs than workers in Wellington city (see Figure 45) than most other territorial authorities. There are relatively few jobs for each worker in the periphery territorial authorities of Upper Hutt (Figure 46), Lower Hutt (Figure 47) and the Kapiti Coast (Figure 48).

The core-periphery dynamic, with workers commuting daily from the periphery to the core, is stronger in the Wellington region than other regions. Each figure below shows the ratio of the number of workers in each local council over residents in each local council relative to New Zealand averages. Appendix 2 provides additional details on local labour markets.

FIGURE 45: DAILY WORKER INFLOW RATE: WELLINGTON CITY

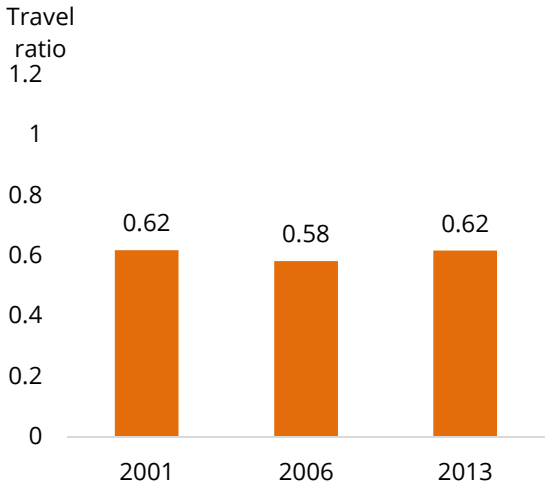
Workers/residents ratio relative to New Zealand



Source: Statistics New Zealand

FIGURE 46: DAILY WORKER INFLOW RATE: UPPER HUTT

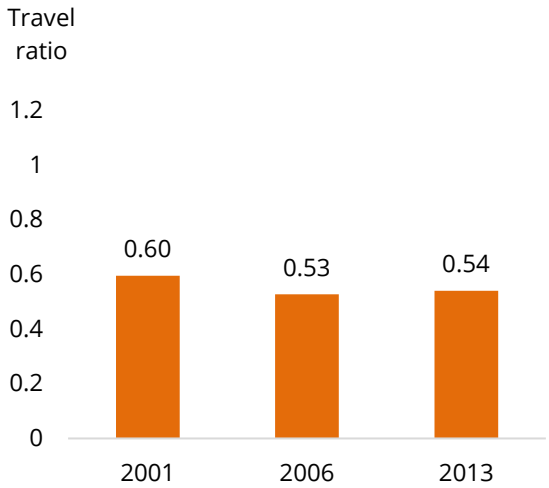
Workers/residents ratio relative to New Zealand



Source: Statistics New Zealand

FIGURE 47: DAILY WORKER INFLOW RATE: LOWER HUTT

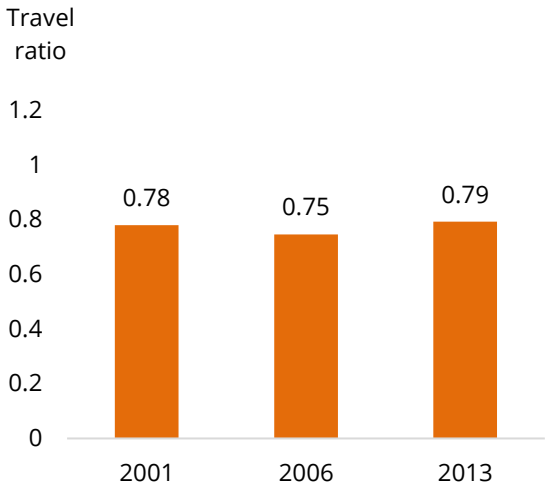
Workers/residents ratio relative to New Zealand



Source: Statistics New Zealand

FIGURE 48: DAILY WORKER INFLOW RATE: KAPITI COAST:

Workers/residents ratio relative to New Zealand



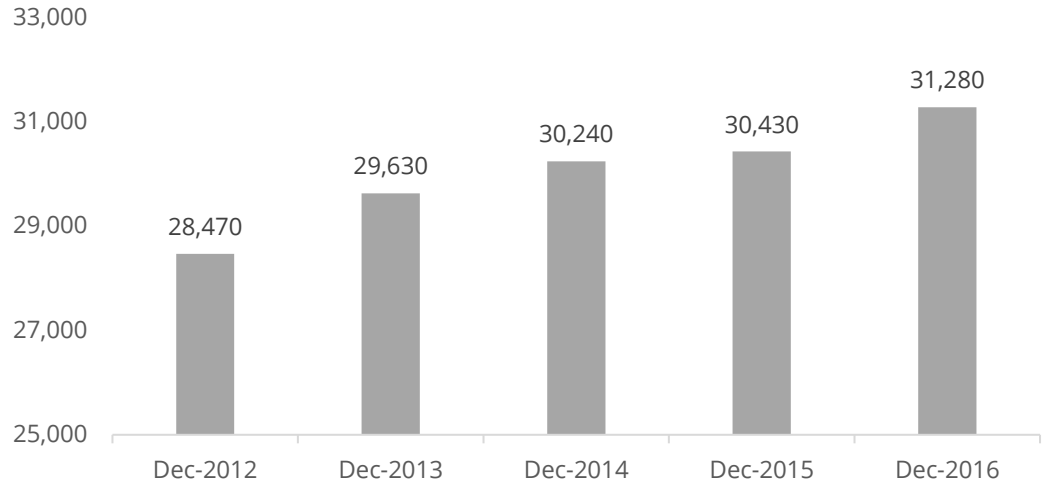
Source: Statistics New Zealand

2.3 Sectoral composition

2.3.1 Government will be a larger share of the economy

The government workforce has been increased in recent years (see Figure 49).

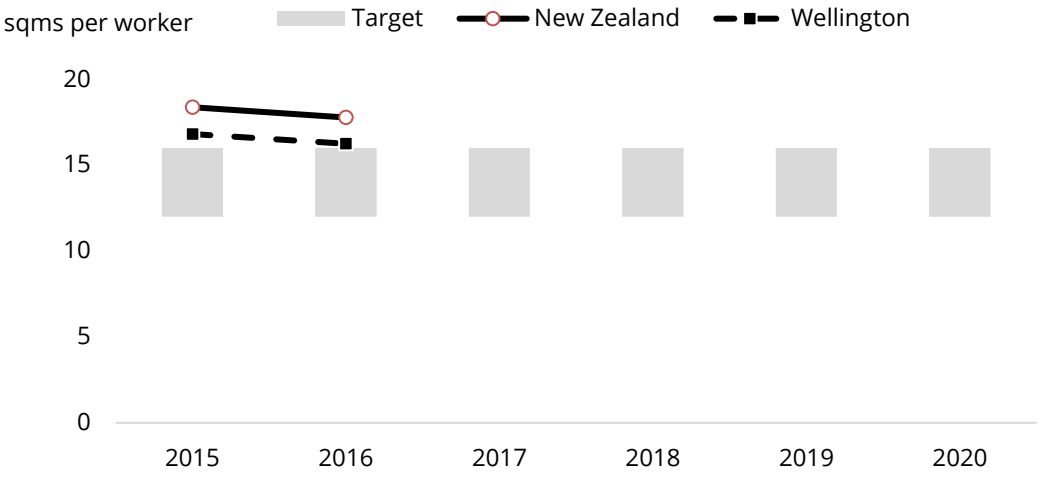
FIGURE 49: THE GOVERNMENT SECTOR WORKFORCE IS INCREASING
Wellington region, LEED database



Source: Statistics New Zealand

Although a modestly growing government sector helps determine the outlook for employment, other pressures are reducing the footprint for each office worker (see Figure 50). An increasing workforce does not necessarily translate to increasing demand for land, a point we return to in section 3.

FIGURE 50: OFFICE SPACE PER GOVERNMENT WORKER IS FALLING
Wellington region office space per worker



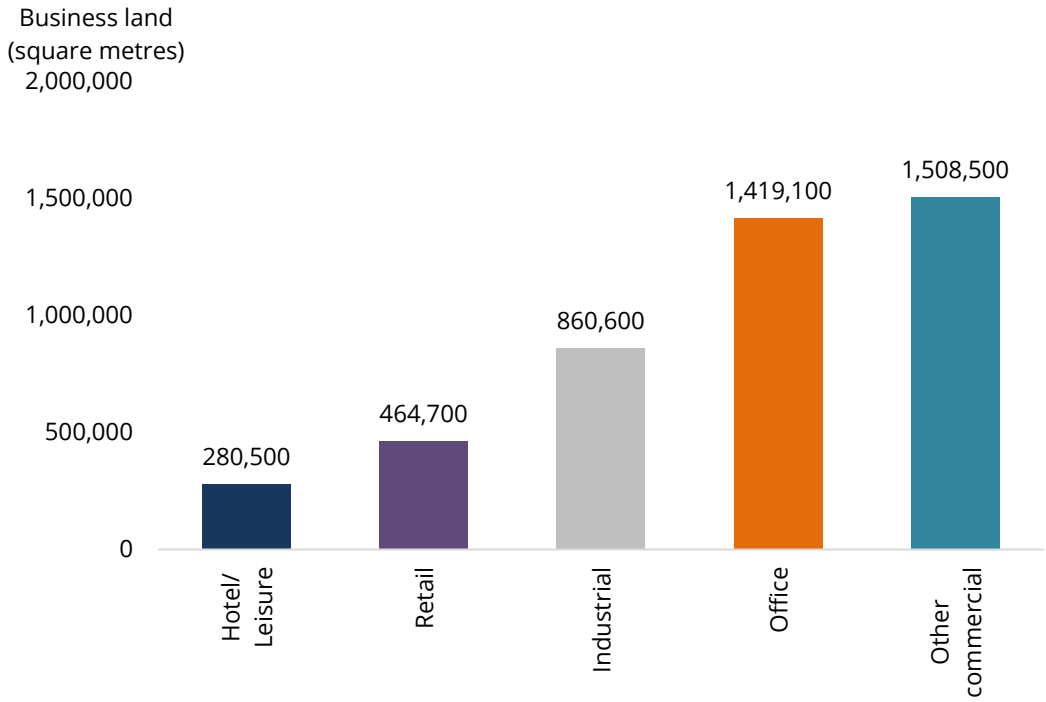
Source: Government Property Group

2.3.2 Tourism has upside potential

The past five years has seen New Zealand benefit from the rapidly growing tourism sector. International visitor arrivals have posted double-digit growth for several years. Initially this growth was fuelled by rapidly growing visitor numbers from China. But more recently, traditional markets have grown too – the sector is firing on all cylinders.

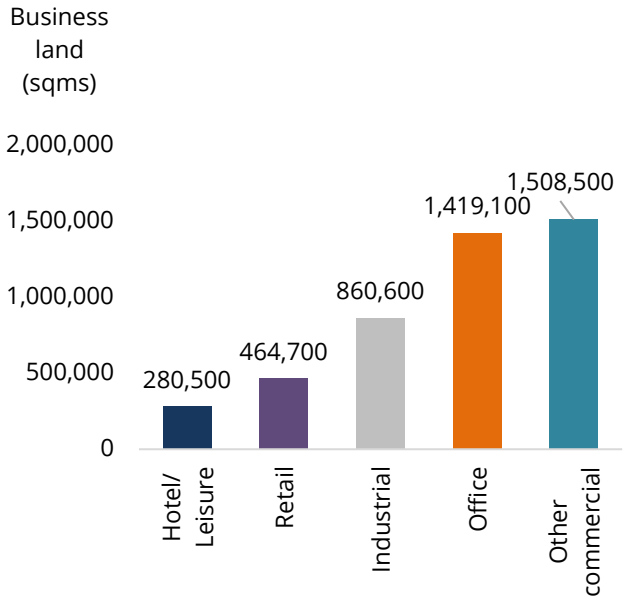
But while growth is particularly rapid, Figure 51 shows the hotel/leisure footprint is much smaller than industrial, commercial, industrial and retails spaces across the region. While tourism helps support retail, right now the impact on business land is at the margin rather than fuelling large changes in aggregate demand. Figure 52 to Figure 55 show a similar story emerges for each local authority.

FIGURE 51: TOURISM CAPTURES HEADLINES BUT NOT FOOTPRINT
Wellington region



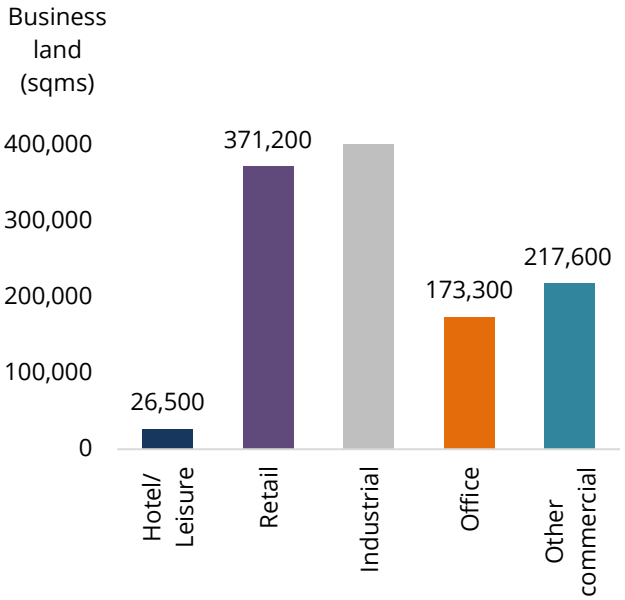
Source: Urban Economics (2016)

FIGURE 52: HOTELS A LITTLE SLICE OF THE CITY
Business land by type, Wellington City, 2016



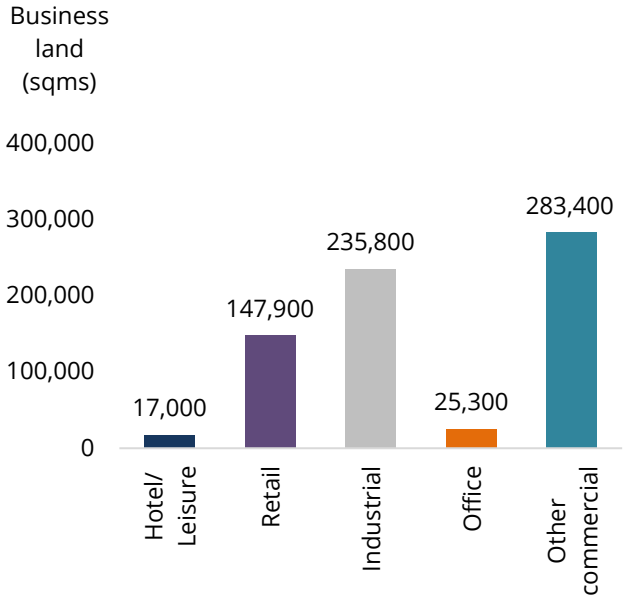
Source: Urban Economics (2016)

FIGURE 53: INDISTRUAL DOMINATES LOWER HUTT
Business land by type, Lower Hutt, 2016



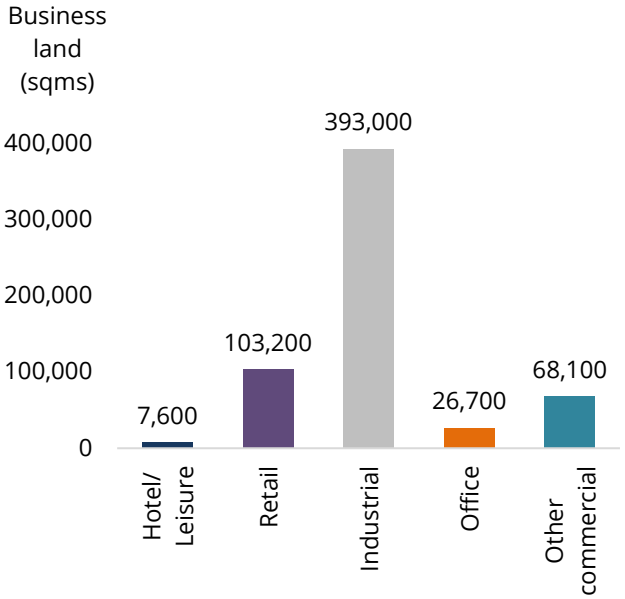
Source: Urban Economics (2016)

FIGURE 54: KAPITI: INDUSTRIAL AND COMMERCIAL
Business land by type, Kapiti Coast, 2016



Source: Urban Economics (2016)

FIGURE 55: UPPER HUTT: MOSTLY INDUSTRIAL
Business land by type, Upper Hutt, 2016

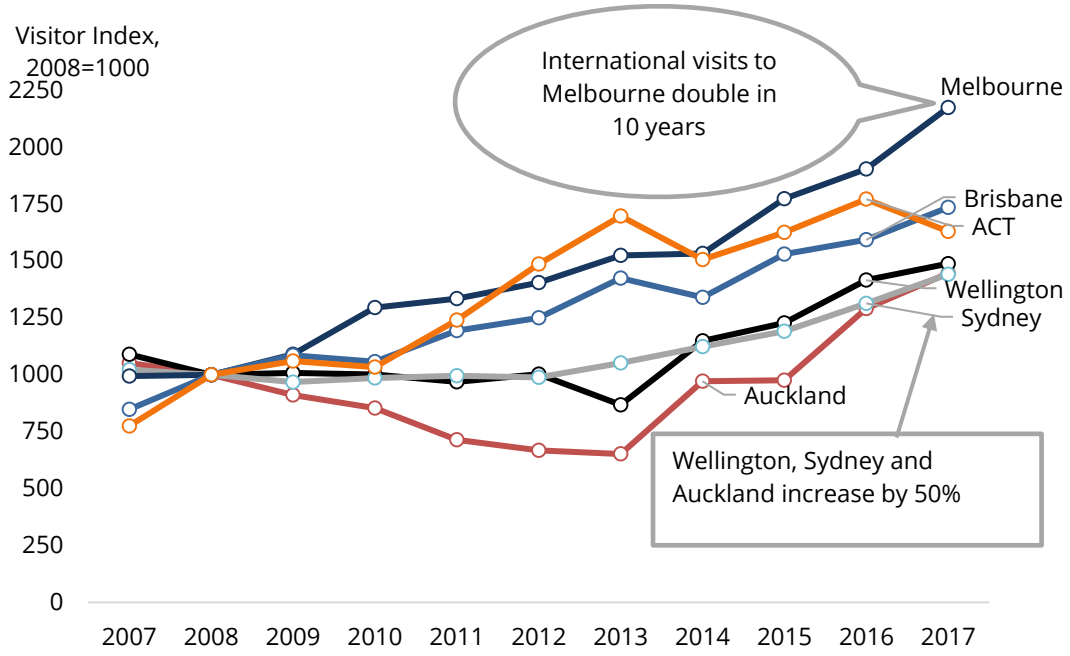


Source: Urban Economics (2016)

But urban tourism markets can change rapidly. Figure 56 shows a group of Australasian cities (including Auckland, Sydney and Wellington) that grew international visits by 50 percent in the 10 years to 2017. Melbourne led the pack, doubling growth across the same 10-year period. If sustained across a 30-year period, such a growth rate would require a substantial increase in business land.

FIGURE 56: CITY VISITS CAN SPUR RAPID TOURISM GROWTH

Growth in international visits, selected cities

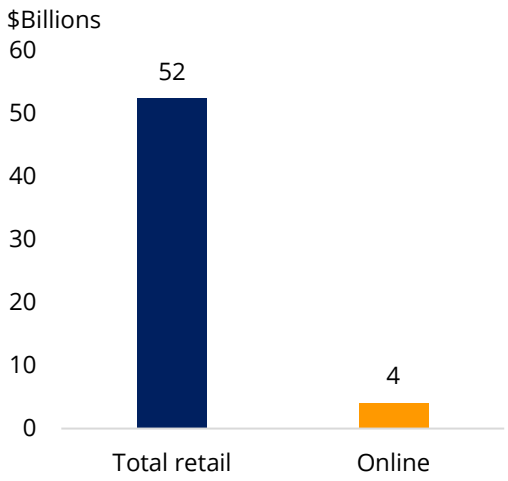


Source: Statistics New Zealand, Australian Bureau of Statistics

2.3.3 Retail under pressure right now

Demand for retail takes up a large footprint across the Wellington region. But many factors, including convenience, access to a wider range of products, the ease of comparing prices and improved logistics, have placed within store shopping under pressure from on-line options. On-line shopping is a small fraction of total retails (see Figure 57) but is growing particularly quickly (see Figure 58). Growth in on-line might be expected to limit marginal growth in the retail sector, reducing overall demand for business land and transforming the type of land required, towards logistics and away from retail space *per se*.

FIGURE 57: ON-LINE IS RELATIVELY SMALL
New Zealand, 2017



Source: Statistics New Zealand

FIGURE 58: BUT ON-LINE GROWING RAPIDLY
New Zealand, 2017

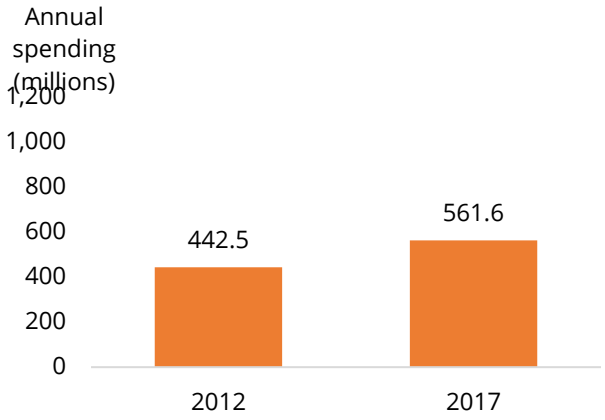
Source: Statistics New Zealand

Growth in on-line might be expected to limit marginal growth in the retail sector, reducing overall demand for business land.

Local experiences will differ. Retail spending grew 16.3 percent across the region as a whole in the five years to October 2017 (see Figure 63).[4] Figure 59 and Figure 60 show differences in the growth experience of local councils over the past five years. Spend in Kapiti Coast and Wellington City has grown at a faster rate than Lower Hutt. Spend grew 27 percent in Kapiti, 17 percent in Wellington City, 17 percent in Upper Hutt and 10 percent in Lower Hutt. Total spend in the region grew 16 percent while transaction grew 24 percent.

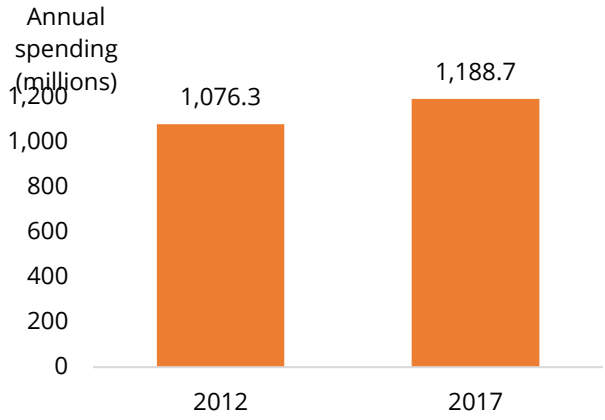
[4] The number of transactions grew at an even faster clip – 23 percent in five years.

FIGURE 59: KAPITI COAST RETAIL SPENDING
Kapiti Coast, year to Oct 2012 and year to Oct 2017



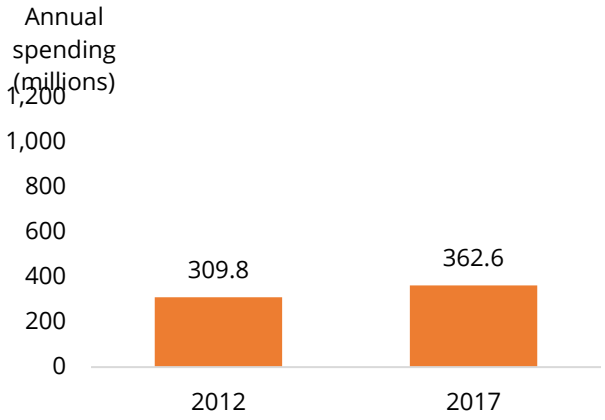
Source: Marketview

FIGURE 60: LOWER HUTT RETAIL SPENDING
Lower Hutt, year to Oct 2012 and year to Oct 2017



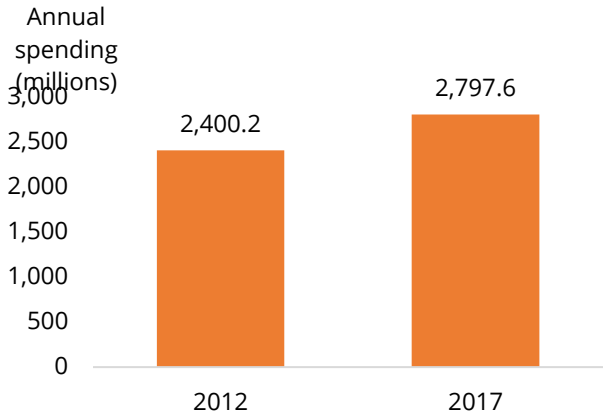
Source: Marketview

FIGURE 61: UPPER HUTT RETAIL SPENDING
Upper Hutt, year to Oct 2012 and year to Oct 2017



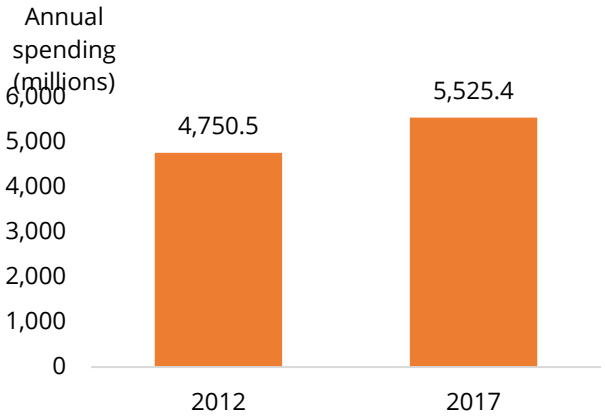
Source: Marketview

FIGURE 62: WELLINGTON CITY RETAIL SPENDING
Wellington City year to Oct 2012 and year to Oct 2017



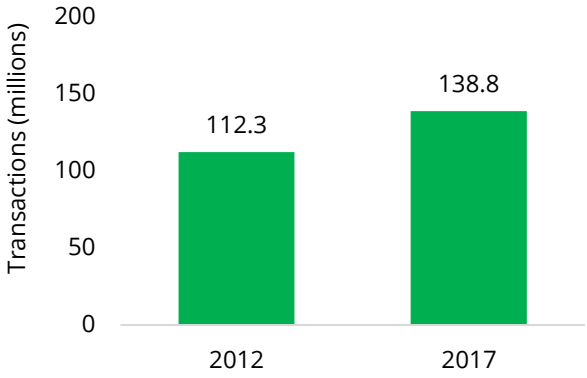
Source: Marketview

FIGURE 63: WELLINGTON REGION RETAIL SPEND
Wellington region, year to Oct 2012 and year to Oct '17



Source: Marketview

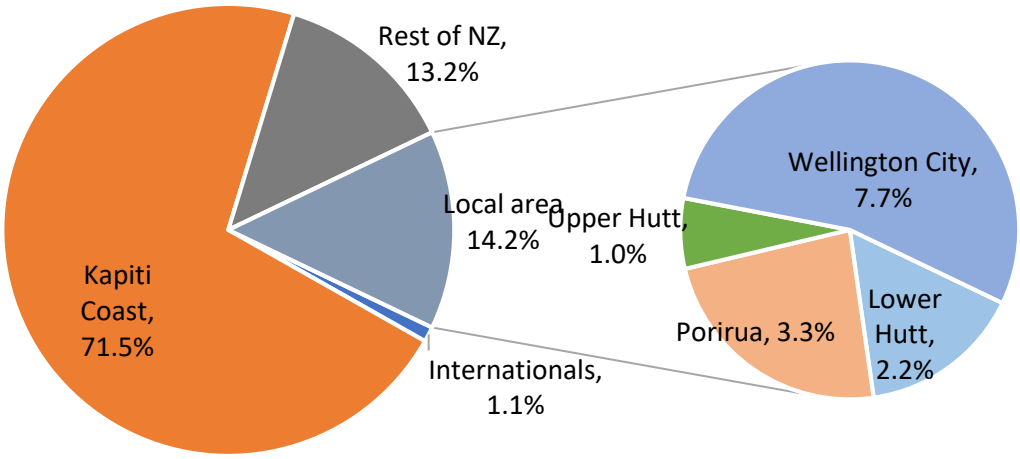
FIGURE 64: WELLINGTON REGION: TRANSACTIONS
Wellington region, year to Oct 2012 and year to Oct '17



Source: Marketview

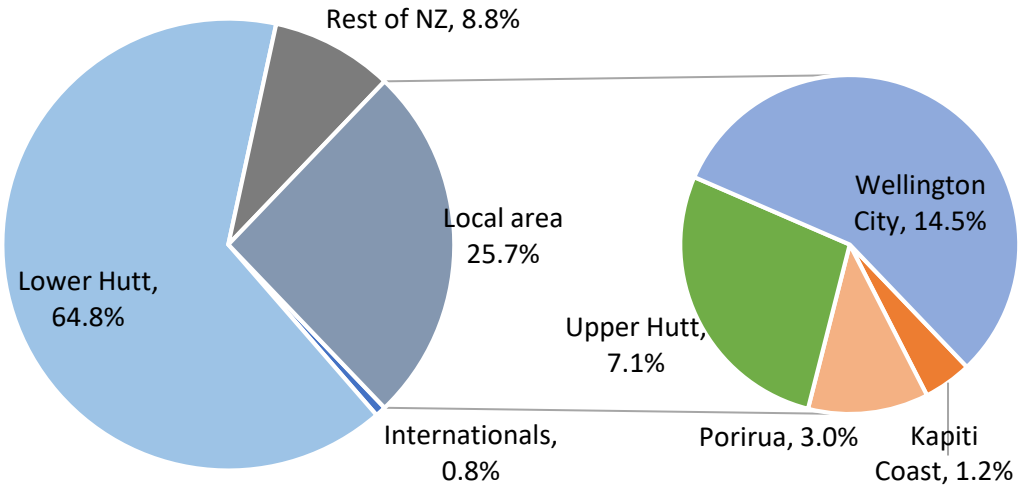
This faster growth rate is underpinned by the growth in the relevant consumer markets. Typically, local consumers provide the bulk of the activity in the local economy. For example, Figure 65 shows the split for retail in Kapiti. Residents comprise the largest share of sales. Residents from Wellington city help support retail spending in Lower Hutt but almost two-thirds of spending is by residents.

FIGURE 65: LOCAL RESIDENTS PROVIDE THE LION'S SHARE OF KAPITI RETAIL SPEND
Origin of retail spending, Kapiti Coast, year to October 2017



Source: Statistics New Zealand, Sense Partners

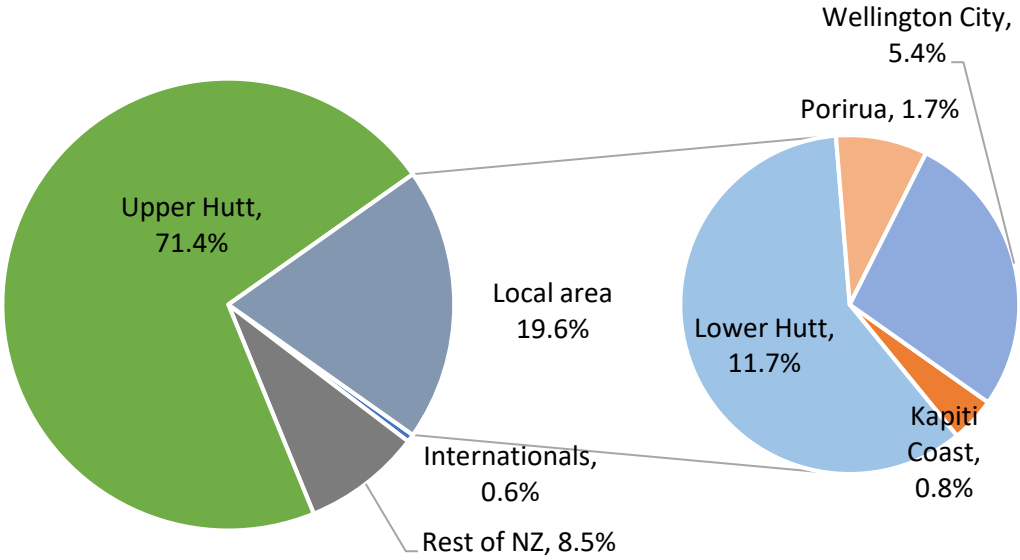
FIGURE 66: LOCAL RESIDENTS AND WELLNGTON CITY DRIVE RETAIL IN LOWER HUTT
Origin of retail spending, Lower Hutt, year to October 2017



Source: Statistics New Zealand, Sense Partners

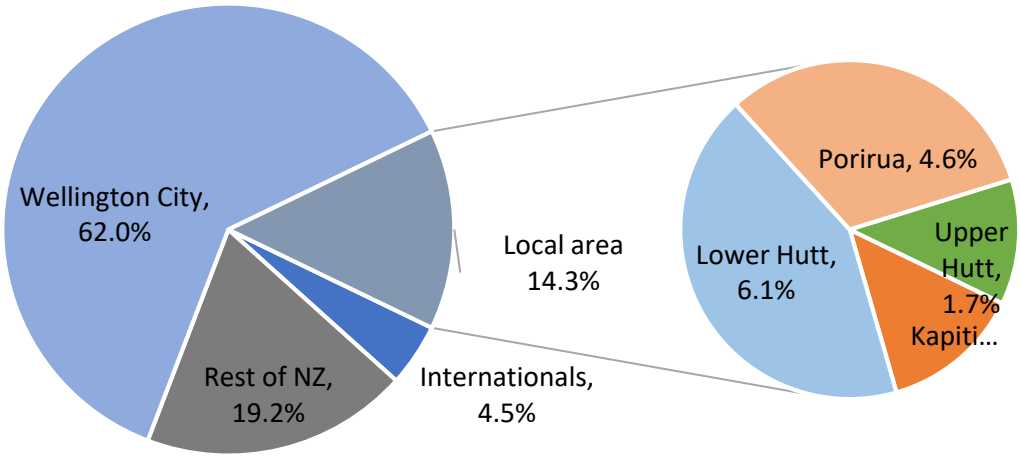
Spending by local residents is 71 percent of spending in the Upper Hutt area and spending by other residents across the region comprises almost 20 percent of retail (see Figure 67). Retail activity in Wellington attracts residents from a variety of sources, including international visitors who make up 4.5 percent of retail spending (see Figure 68).

FIGURE 67: RESIDENTS OF UPPER HUTT DRIVE RETAIL IN UPPER HUTT
Origin of retail spending, Upper Hutt, year to October 2017



Source: Statistics New Zealand, Sense Partners

FIGURE 68: VISITORS GENERATE A QUARTER OF WELLINGTON RETAIL SPENDING
Origin of retail spending, Wellington City, year to October 2017



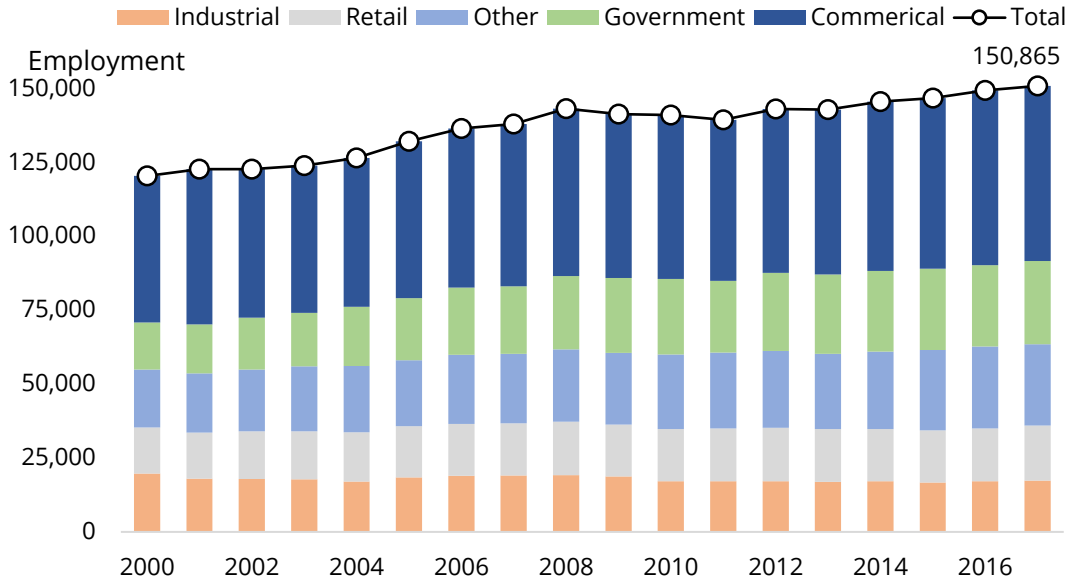
Source: Statistics New Zealand, Sense Partners

2.3.4 A granular look reveals sub-industry growth

Looking a little below the surface of headline job numbers reveals the industry dynamics within local areas. Wellington's employment base swings on the government sector, increasing 76 percent since 2000. Fewer industrial jobs has hit Upper Hutt hard. In the period since the peak of industrial jobs in 2006, industrial employment has fallen by almost 45 percent.

FIGURE 69: GOVERNMENT FUELLED WELLINGTON'S JOB GROWTH SINCE 2000

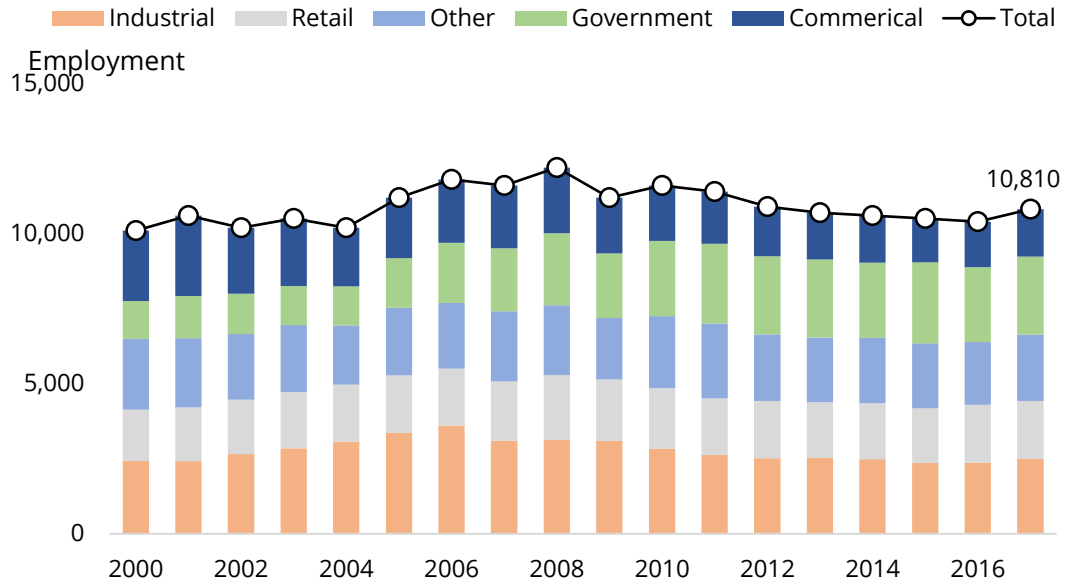
Wellington city employment by industrial sub-classification, 2000-2017



Source: Statistics New Zealand, Sense Partners

FIGURE 70: INDUSTRIAL DECLINE HITS UPPER HUTT EMPLOYMENT NUMBERS

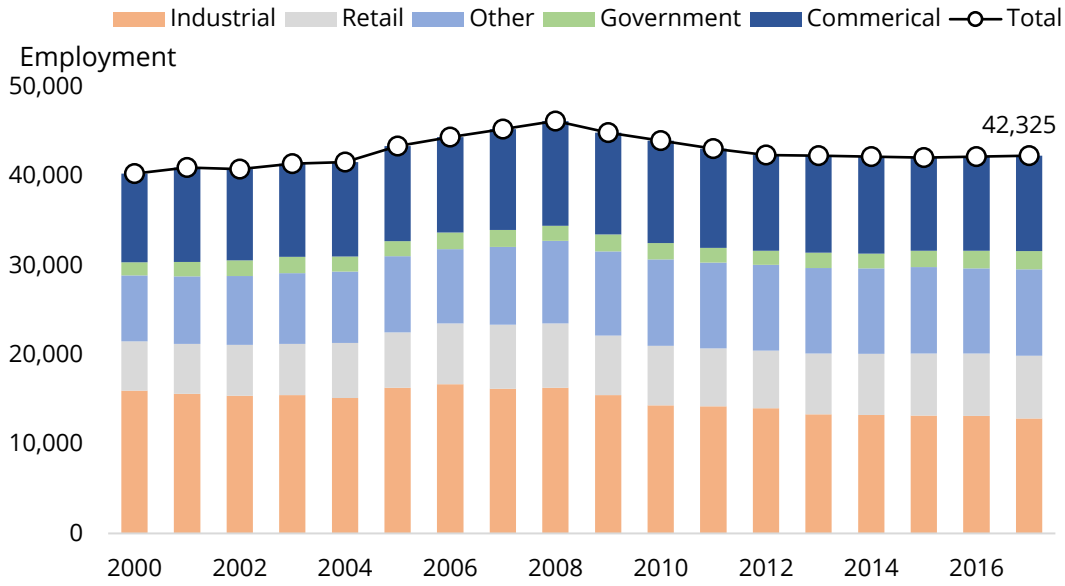
Upper Hutt employment by industrial sub-classification, 2000-2017



Source: Statistics New Zealand, Sense Partners

FIGURE 71: FEWER COMMERICAL AND INDUSTRIAL JOBS IN LOWER HUTT

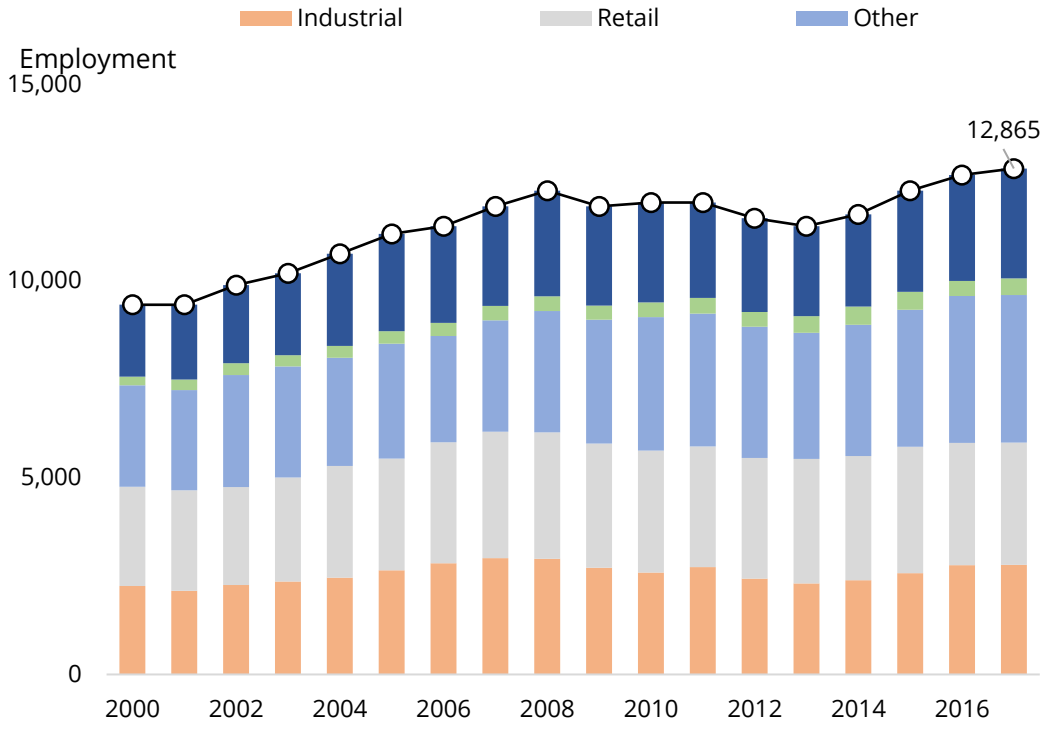
Lower Hutt employment by industrial sub-classification, 2000-2017



Source: Statistics New Zealand, Sense Partners

FIGURE 72: INCREASING EMPLOYMENT ON THE KAPITI COAST IS BROAD-BASED

Kapiti Coast employment by industrial sub-classification, 2000-2017

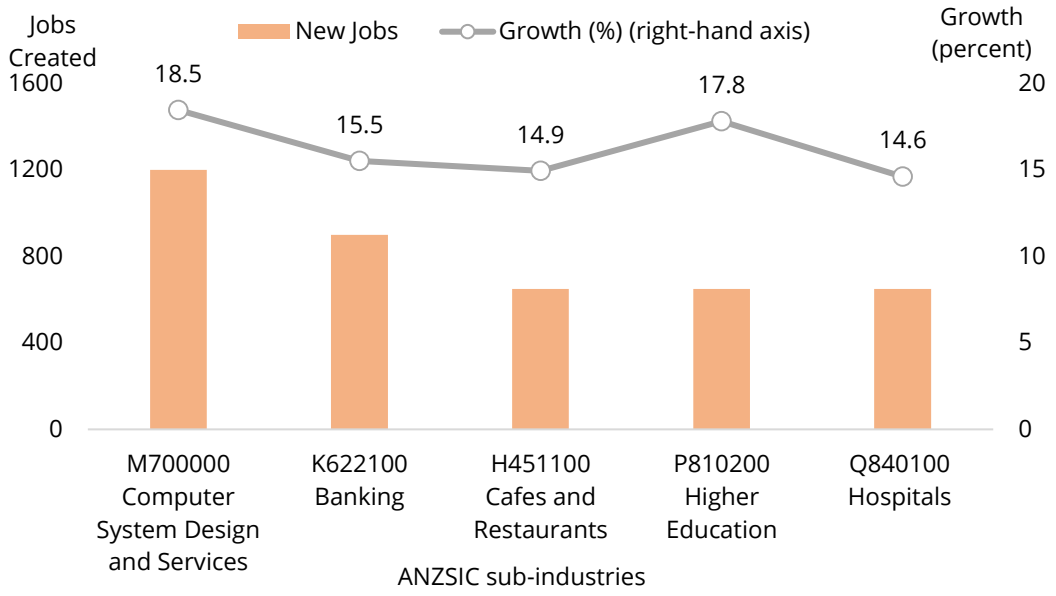


Source: Statistics New Zealand, Sense Partners

But taking a more refined approach can reveal where the industries of the future lie. We first compute the five most sub-industries responsible for the largest increase in job numbers for each of the local authorities at the ANZSIC 6-digit level (a classification with over 800

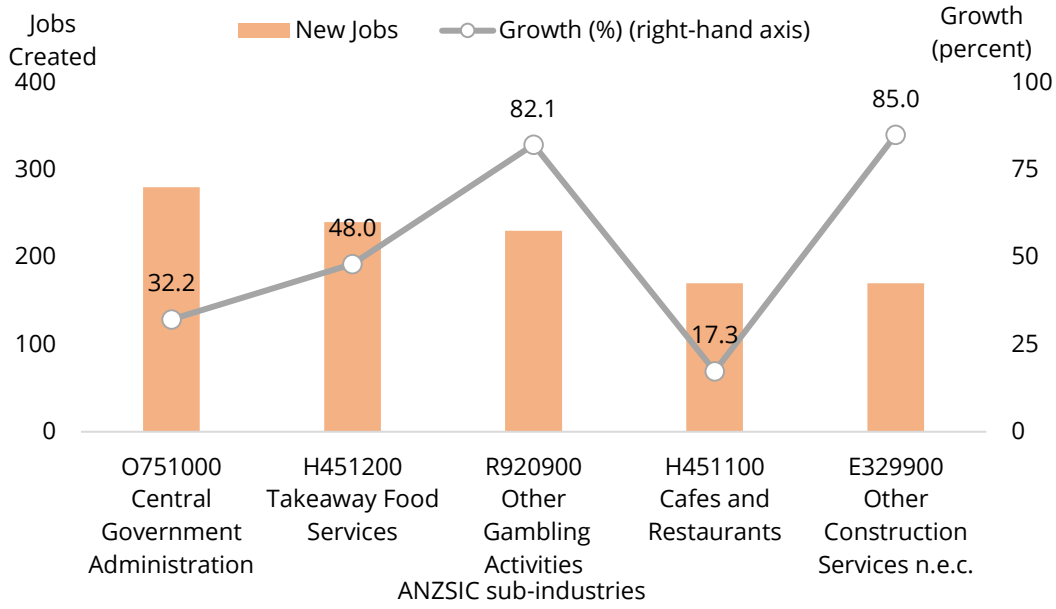
subindustries). This shows some niche industries are posting exponential growth rates and have the potential to become dominant employers over the next 30 years (see Figure 73, Figure 74, Figure 75, Figure 76),

FIGURE 73: WELLINGTON CITY HAS RAPIDLY-GROWING NICHE INDUSTRIES
Wellington City, Job Creation 2015 -2017



Source: Statistics New Zealand, Sense Partners

FIGURE 74: LOWER HUTT POSTED STRONG GROWTH IN SOME SUB-INDUSTRIES
Lower Hutt, Job Creation 2015 -2017

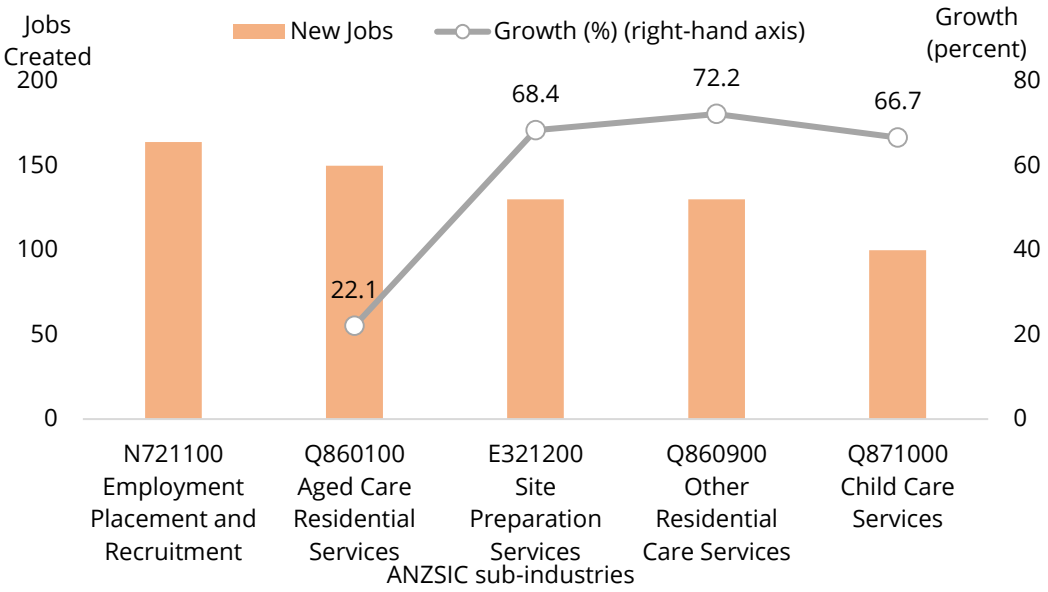


Source: Statistics New Zealand, Sense Partners

Wellington City's computer design industry added 1,200 jobs in the three years to 2017 and holds the possibility of providing many more future employment opportunities. Other niche

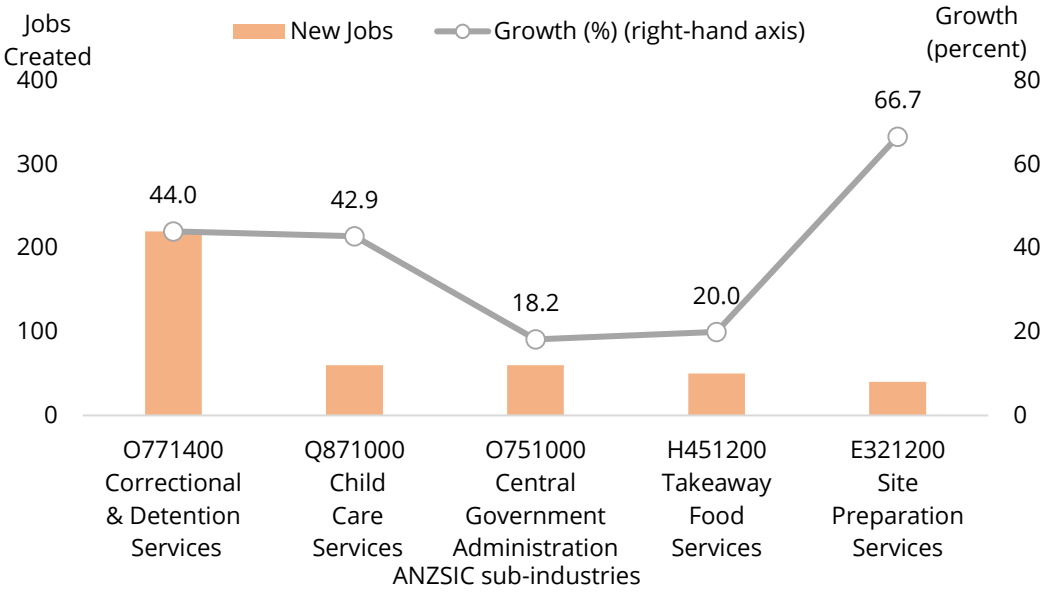
employers include Banking, Higher Education and Hospital workers. Opportunities for other councils include aged care and a broader base of sub-industries. Some of the job growth in Kapiti is likely to relate to the development of the expressway.

FIGURE 75: AGED CARE AND CHILD CARE SPARK GROWTH ON THE KAPITI COAST
Kapiti Coast, Job Creation 2015 -2017



Source: Statistics New Zealand, Sense Partners

FIGURE 76: UPPER HUTT HAS A VARIETY OF FAST-GROWING SUB-INDUSTRIES
Upper Hutt, Job Creation 2015 -2017



Source: Statistics New Zealand, Sense Partners

3. The future economy

3.1Our modelling approach

3.1.1 Overview

To understand future demand for business land, section 2 highlighted we first need to project economic activity across the region. Rather than work with aggregate economic activity, we prefer to use employees demand as the relevant metric to allocate business land. We then develop estimates of business land demand from future employment estimates in section 4.

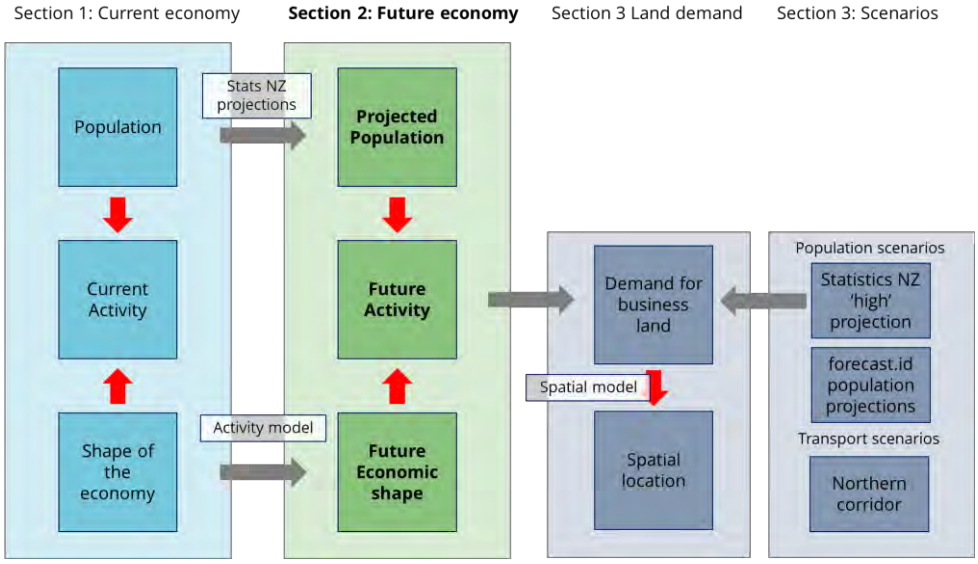
Since demand for business land differs across industries, we need to project the economic shape of the regional economy. We also want to allocate where business land locates across the region. So we need a projection that allows activity to move across districts. We also need a projection that can be mapped back to Statistics New Zealand's projections for population growth rate as a benchmark. These requirements suggest a staged process:

- Step one: Use Statistics New Zealand's medium growth projection to set the overall growth rate for the region's labour force.
- Step two: Combine with a forecast of the industrial shape of the regional economy to obtain future employment activity.
- Step three: Allocate economic activity across the local districts.

Figure 77 shows a stylised representation of how we combine Statistics New Zealand's population projections with our model of the shape of the local economy to obtain future activity in this section of our report. We make high-level allocations of activity to local districts.

FIGURE 77: WE USE POPULATION AND INDUSTRY SHAPE TO FORECAST ACTIVITY

Stylised approach to forecasting activity in stage two



Source: Sense Partners

3.2 Population projections

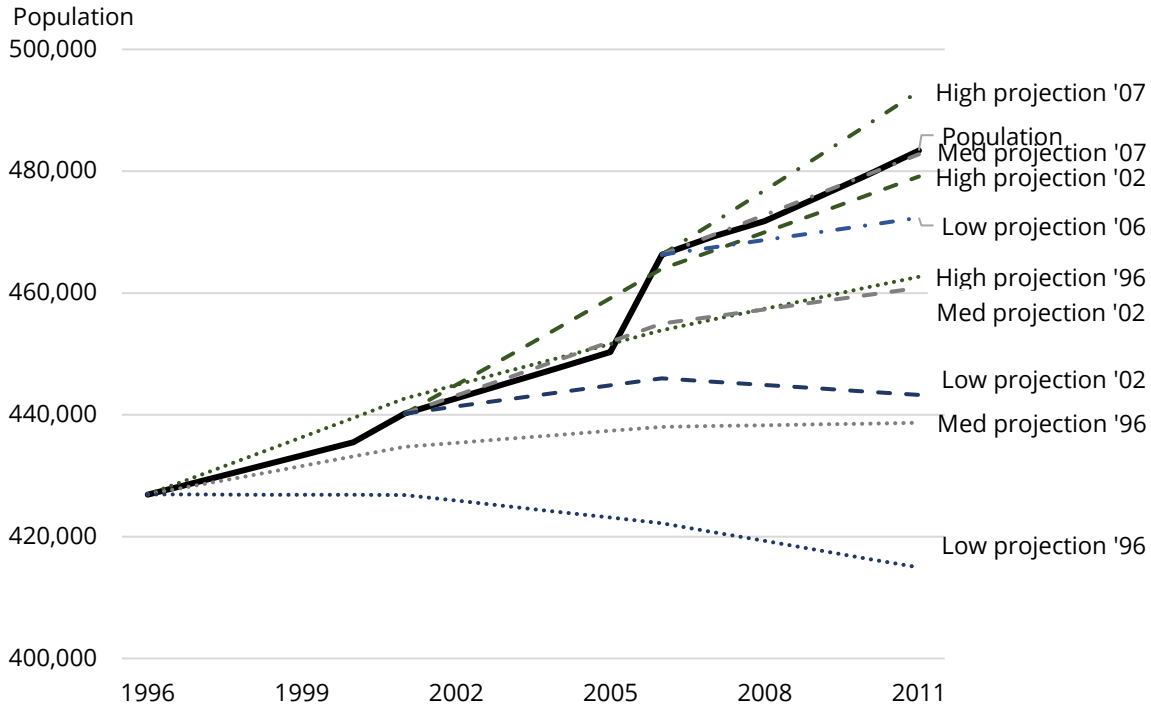
Our projections need to align with the population projections produced by Statistics New Zealand. But rather than using the future population growth rate to inform business land demand, we first obtain a projection for the future labour force in the region. We achieve this by applying national, age-specific labour force participation rates to the local population.

Statistics New Zealand's medium-term population projections have tended to under-predict the national population in recent years. Among other factors, Statistics New Zealand's population projections miss a structural trend in inward migration that suggests Statistics New Zealand will continue to under-predict the population.

Statistics New Zealand have underpredicted growth in the region (see Figure 78). Given the importance of the population forecasts for predicting future activity, in addition to working with Statistics New Zealand's medium projection we also use results based on the high projection and projections from forecast.id.

FIGURE 78: STATISTICS NEW ZEALAND PROJECTIONS FOR THE WELLINGTON REGION TEND TO UNDERSHOOT POPULATION GROWTH

Statistics New Zealand population estimates and subnational projections for Wellington region



Source: Statistics New Zealand

3.3 Future economic activity

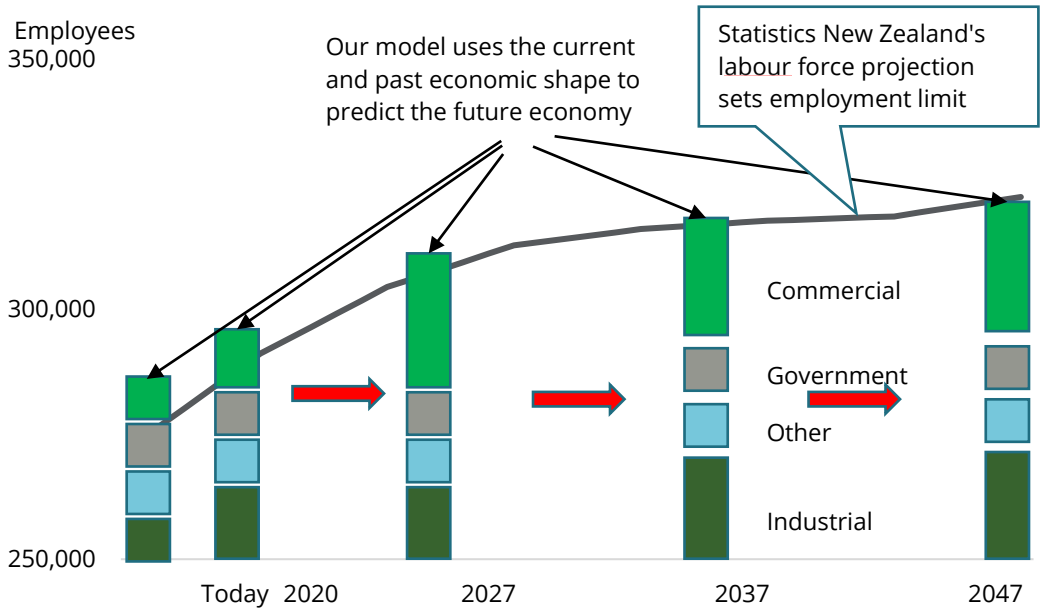
To model future economic activity, we use a VAR or Vector Auto-Regressive model of the shape of the economy. VAR models are a useful economic model for a variety of purposes including explaining economic data, making predictions about the future, generating scenarios and providing policy advice.

VAR models have a long history in economics.[5] So we are using a tool that is well understood and has been deployed across many applications. VAR models can address several questions, including for example, thinking about how changes in interest rates might impact on house prices, or how immigration might impact on economic growth.

Our focus is to forecast the shape of the Wellington economy in 3-, 10- and 30-years' time. To ensure the shape of the economy is useful to think about the demand for business land, we first corral Statistics New Zealand's counts of employees into bins (such as industrial, commercial, government and other activity) that provide insight to demand for business land.

To move from the outlook for the Wellington region to the local outlook for each district, we need to allocate expected employment activity by industry throughout the region to specific districts. We allow the shares of each district to change over time by building simple single equation models of the industry share of each district. This allows the district share of employment by industry to change over time (see Figure 81 for a stylised view).

FIGURE 79: VAR MODEL PROJECTS THE INDUSTRY SHAPE OF WELLINGTON ECONOMY



Source: Statistics New Zealand, Sense Partners

[5] For example, the use of VARs for regional forecasting in Anderson (1979) and the importance of VARs in macroeconomic literature in Sims (1980).

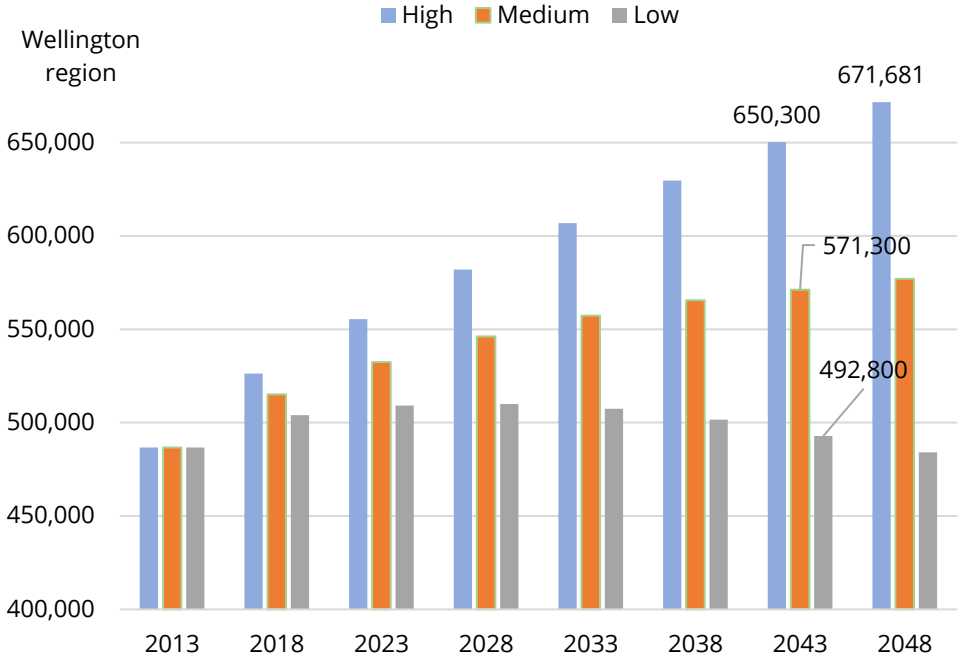
3.3.1 Projecting labour force growth

Population growth, and demographic trends more broadly, are crucial for determining activity in local economies. Demographic trends will influence demand trends and growth potential, especially via life-cycle effects. But population growth is key for driving economic growth.

But knowing how local populations have developed relative to national trends is informative for thinking about future activity growth. Figure 80 shows three sets of population projections for the Wellington region: (i) Low; (ii) Medium; and (iii) High.

We use the medium projection as our baseline. While we carry over both the low and high projections through some of our analysis, the weight of evidence suggests adopting the high projection as a scenario and generally omit the low scenario from stage three analysis. In stage 3, we also construct a scenario that uses population forecasts from population.id. These forecasts take a similar approach to Statistics New Zealand but are more up-to-date.

FIGURE 80: WE USE STATISTICS NEW ZEALAND'S MEDIUM PROJECTION AS BASELINE
Population projections, Wellington region 2013-2048



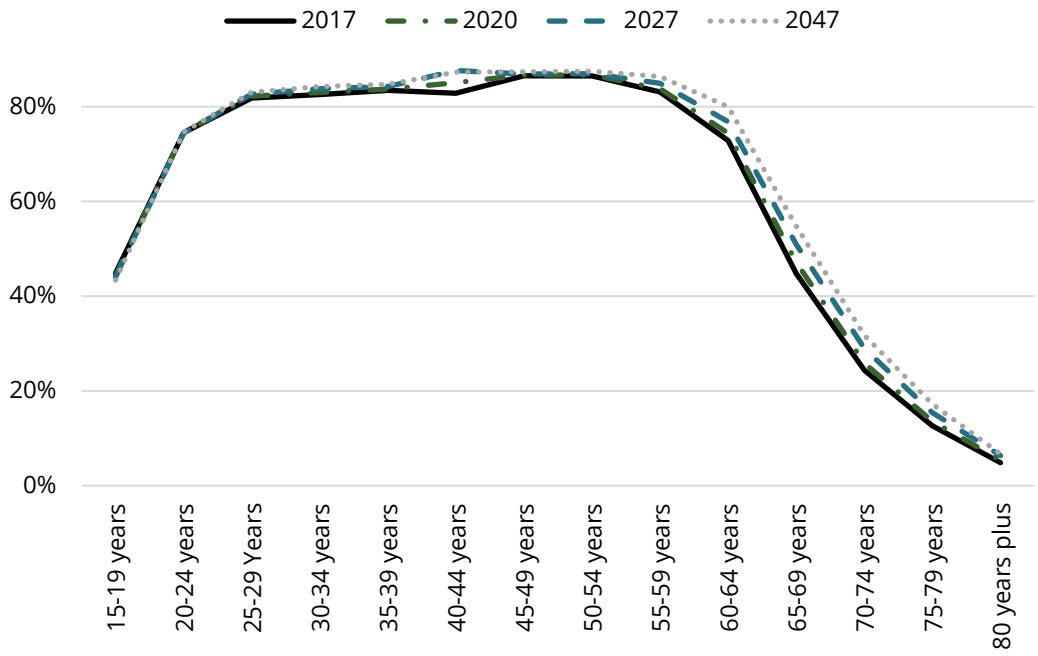
Source: Statistics New Zealand

Since Statistics New Zealand do not produce subnational labour force projections, we use national labour force participation rates to map from the regional population projections to workforce projections. The national labour force projections (see Figure 81) are age-specific.

We then apply the age-specific labour force participation rates to age-specific regional population forecasts to obtain our projection for the regional labour force (see Figure 82). This projection effectively sets the pace of employment activity within the region.

FIGURE 81: WE APPLY NATIONAL LABOUR FORCE PARTICIPATION RATES BY AGE TO OBTAIN REGIONAL WORKFORCE PROJECTIONS FOR WELLINGTON

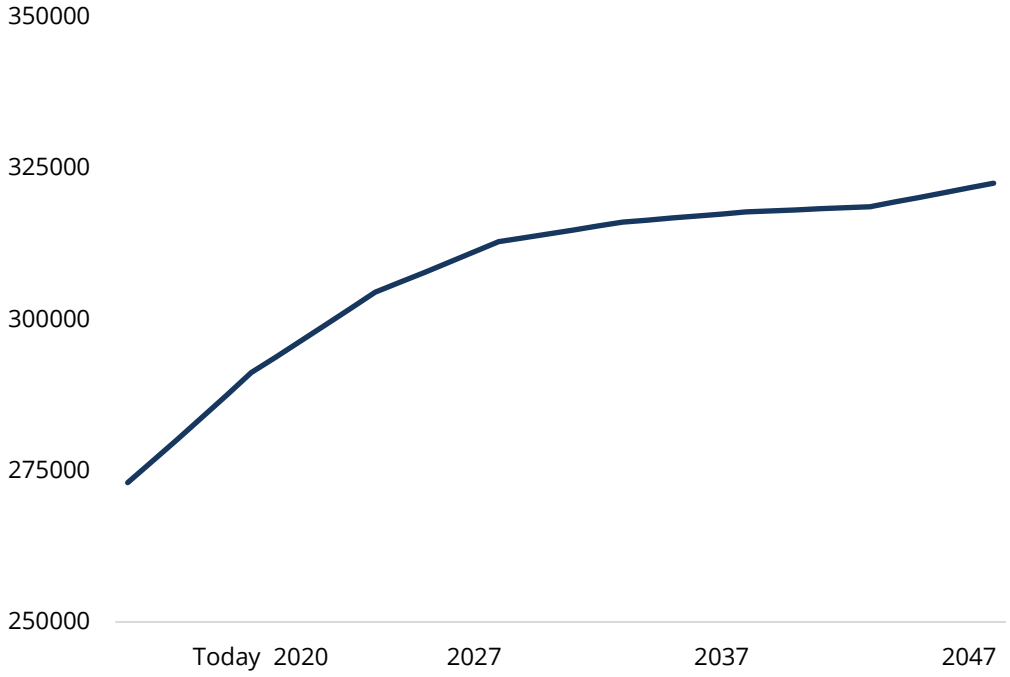
Labour force participation rates, by age, New Zealand projection, 2017-2047



Source: Statistics New Zealand

FIGURE 82: OUR LABOUR FORCE PROJECTION SETS THE PACE OF ACTIVITY GROWTH

Labour force participation, Wellington, 2017-2047



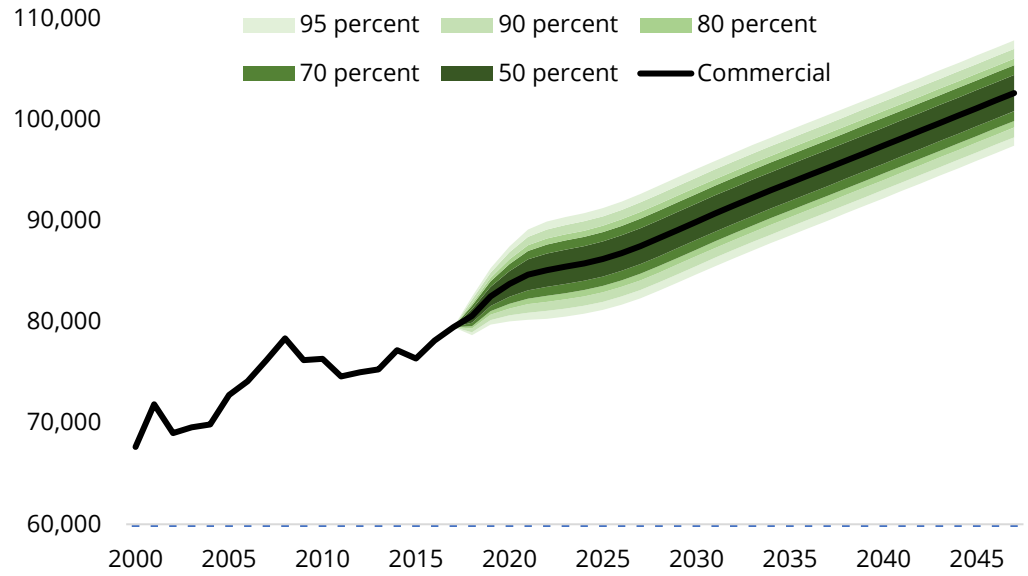
Source: Statistics New Zealand, Sense Partners

3.3.2 Projecting economic activity

Our projections combine our VAR model (Appendix 1 for additional detail) of the industry shape of the economy with the regional labour force derived by Statistics New Zealand's medium population projection and age-specific national labour force participation rate. Figure 83 and Figure 84 show commercial and retail are expected to perform well.

FIGURE 83: COMMERCIAL EMPLOYMENT SET TO FLOURISH TO 2047

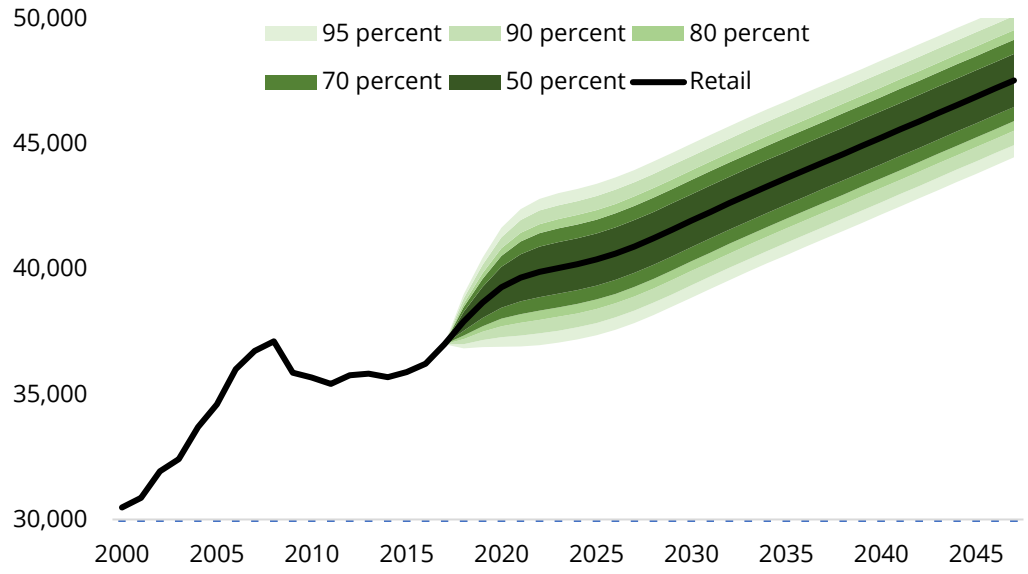
Wellington Region, Employees by industry, 2000-2047, Commercial



Source: Statistics New Zealand, Sense Partners

FIGURE 84: HISTORY SUGGESTS RETAIL WILL RETURN TO STRONG GROWTH RATES

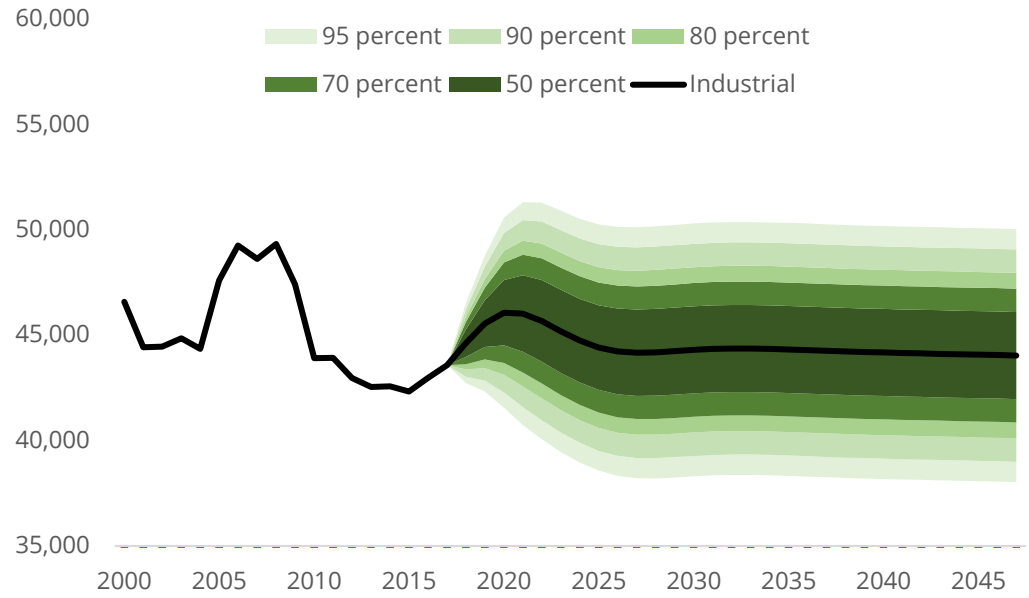
Wellington Region, Employees by industry, 2000-2047, Retail



Source: Statistics New Zealand, Sense Partners

The outlook for industrial employment is more mixed. The slump in industrial employment after the GFC implies a weak growth outlook although the precise numbers are very uncertain.

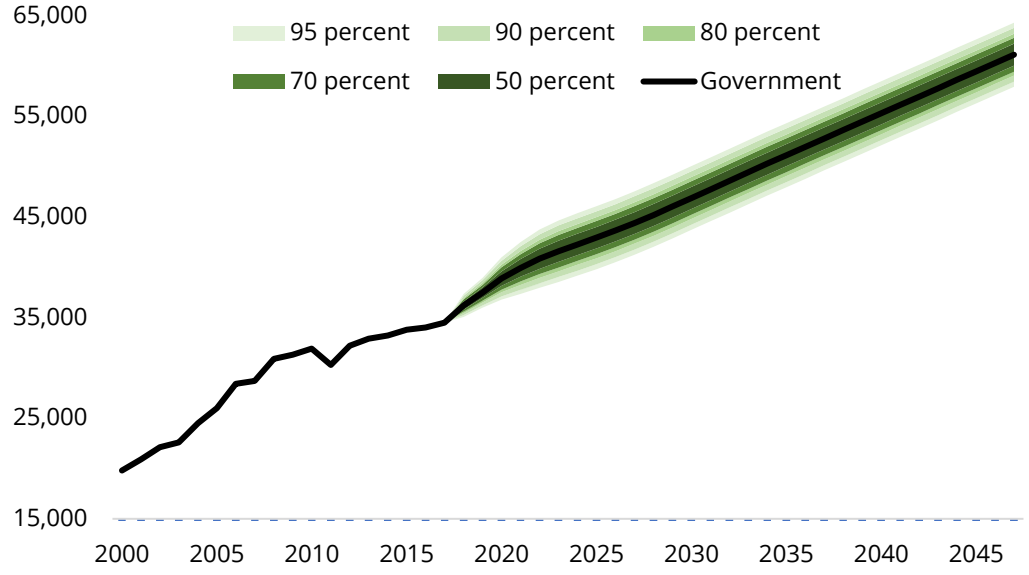
FIGURE 85: OUTLOOK FOR INDUSTRIAL ACTIVITY UNCERTAIN
Wellington Region, Employees by industry, 2000-2047, "Industrial"



Source: Statistics New Zealand, Sense Partners

In contract, growth in the government sector is predicted to continue steadily. Our numbers suggest government activity decreases as a share of the national economy but increases a little as a share of the regional Wellington economy.

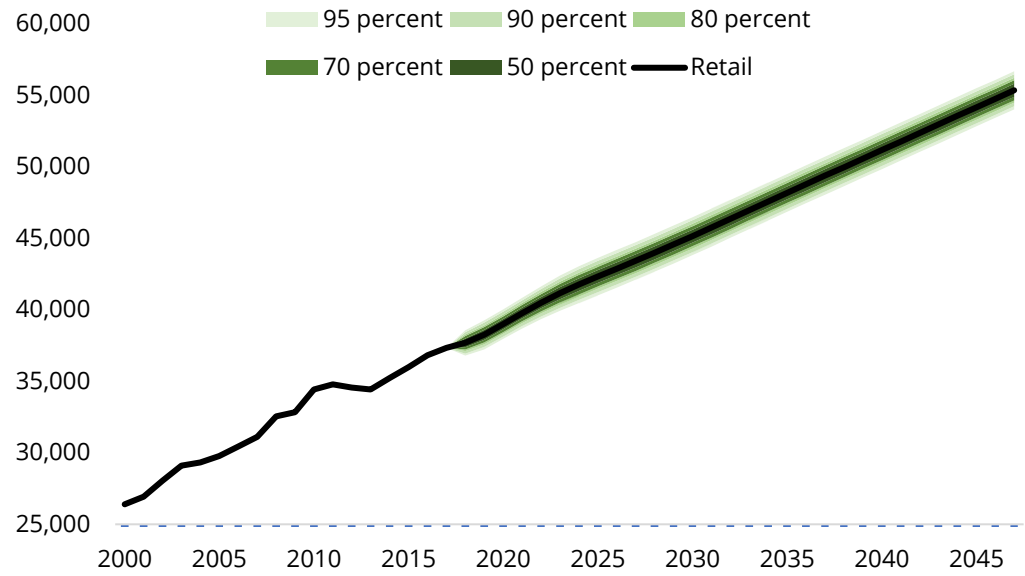
FIGURE 86: EXPECT EMPLOYMENT IN THE GOVERNMENT TO GROW STRONGLY
Wellington Region, Employees by industry, 2000-2047, Government



Source: Statistics New Zealand, Sense Partners

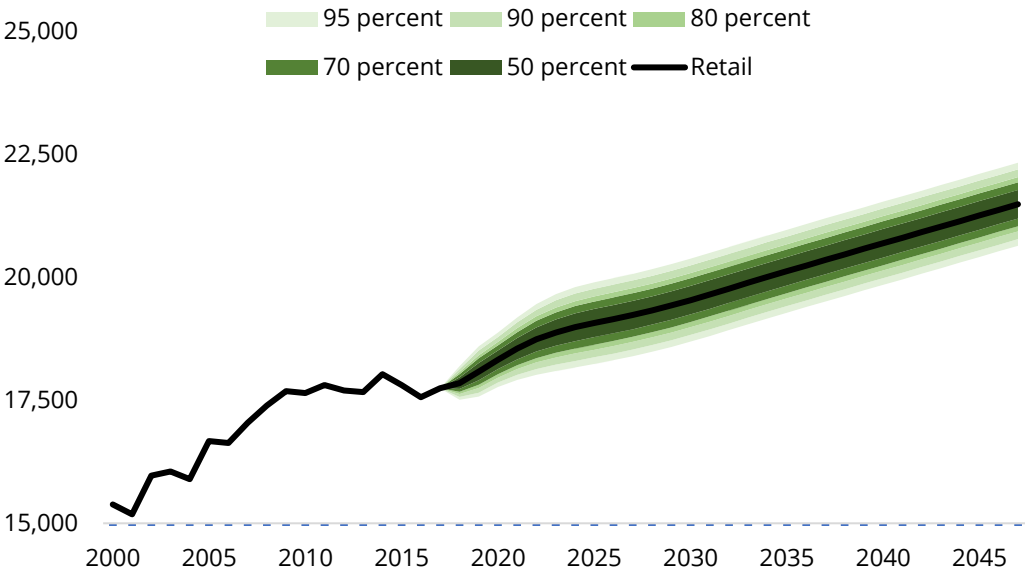
We choose to also forecast health, education and training (see Figure 87) as an industry that relies on large but infrequent infrastructure projects to support activity. The past twenty years implies strong growth to 2047. Employment in a "grab bag" of other industries is predicted to lift more slowly in the future (see Figure 88).

FIGURE 87: HEALTH, EDUCATION AND TRAINING ANTIPICATED TO GROW
Wellington Region, Employees by industry, 2000-2047, "Health, Education and Training"



Source: Statistics New Zealand, Sense Partners

FIGURE 88: MIX OF OTHER INDUSTRIES EXPECTED TO POST MODEST GROWTH RATES
Wellington Region, Employees by industry, 2000-2047, "Other"

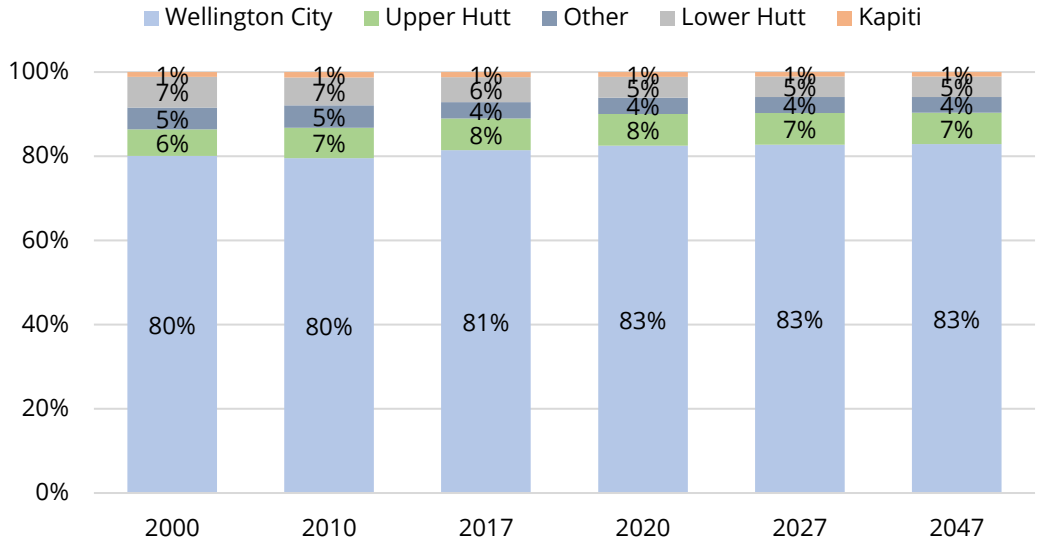


Source: Statistics New Zealand, Sense Partners

3.4 The local activity outlook

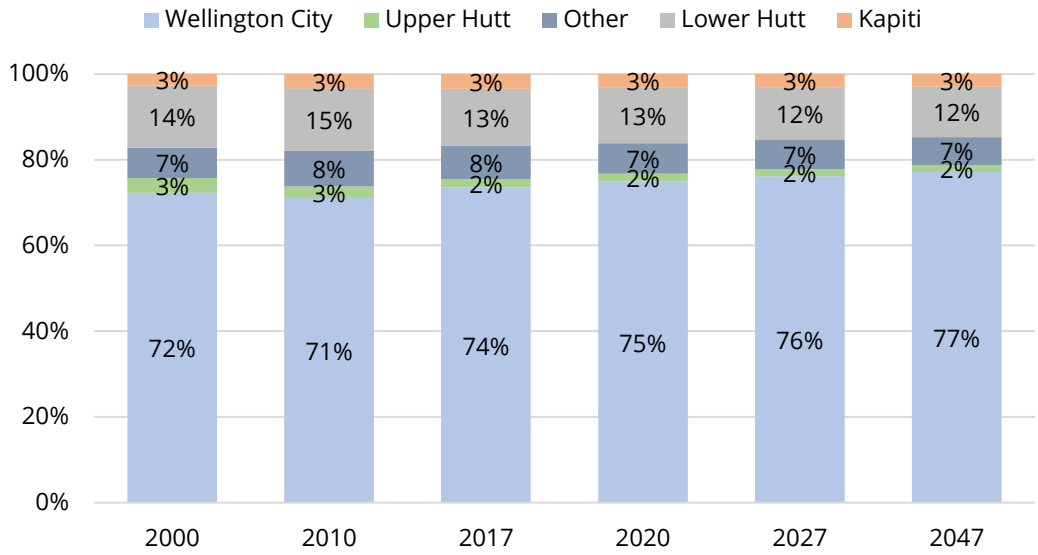
We use the share of each district's industry employment to allocate future activity across the region. Figure 89 shows that Wellington City has, retains, and grows the lion's share of government workers across the region. We include workers from other parts of the Wellington region – that is, Porirua, Masterton, Carterton and South Wairarapa – in the 'Other' category.

FIGURE 89: WELLINGTON CITY TO GROW THE SHARE OF GOVERNMENT WORKERS
Share of Government employment in Wellington region, selected years



Source: Statistics New Zealand, Sense Partners

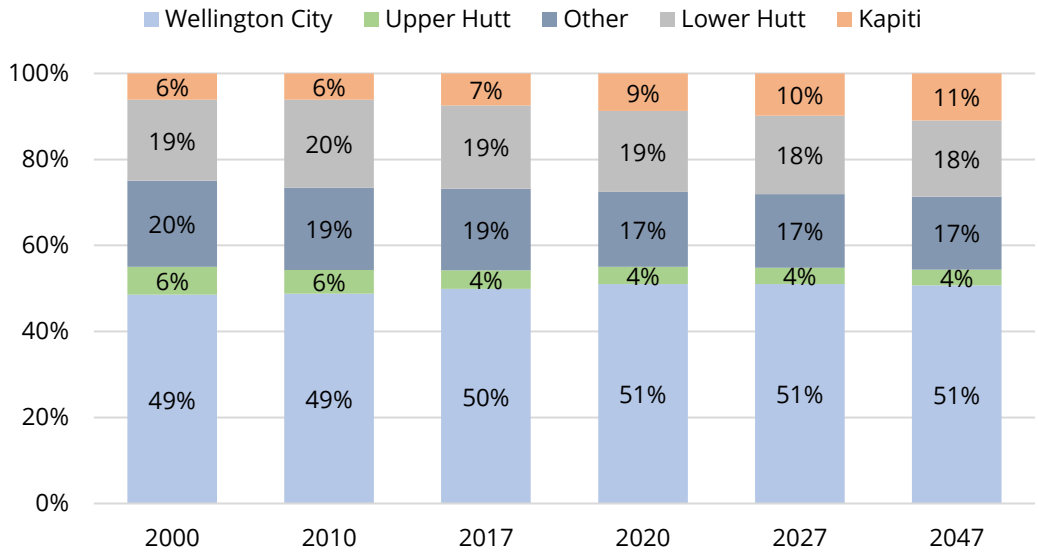
FIGURE 90: COMMERCIAL EMPLOYMENT IN WELLINGTON CITY ALSO A LITTLE LARGER
Share of Commercial employment in Wellington region, selected years



Source: Statistics New Zealand, Sense Partners

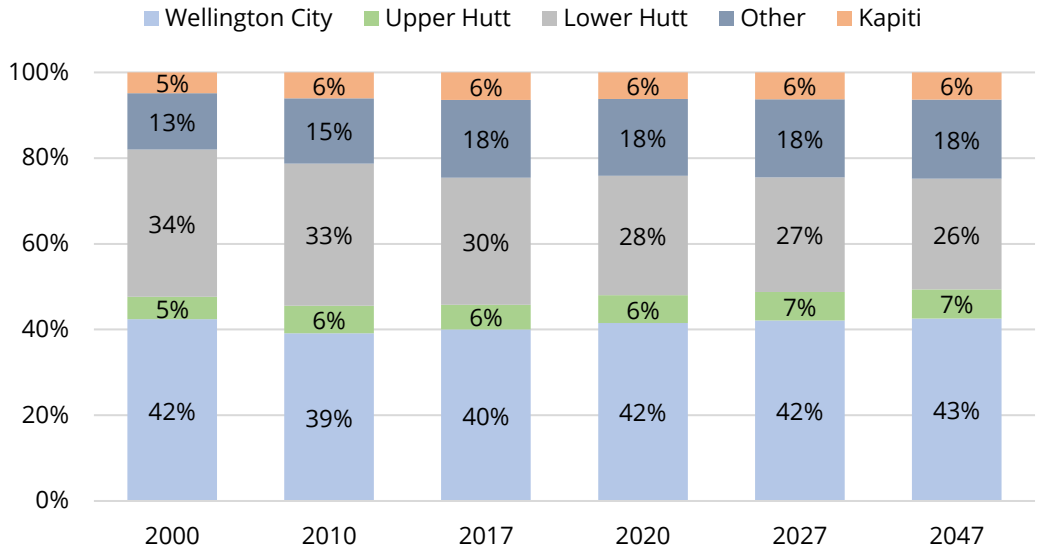
Figure 91 shows Kapiti increases its share of workers in health, education and training a little by 2047. Wellington City accounts for about half of employment in the sector over time. Kapiti also has many self-employed workers that leave the average firms size at 2.5 – unchanged from 2000 and much lower than the national average of 3.8. Industrial employment across the region is flat or declining over the forecast horizon to 2047. Figure 92 shows to expect outright declines in Lower Hutt where the share of industrial employment declines over time.

FIGURE 91: KAPITI INCREASES HEALTH, EDUCATION AND TRAINING EMPLOYMENT
Share of Health, Education and Training employment in Wellington region, selected years



Source: Statistics New Zealand, Sense Partners

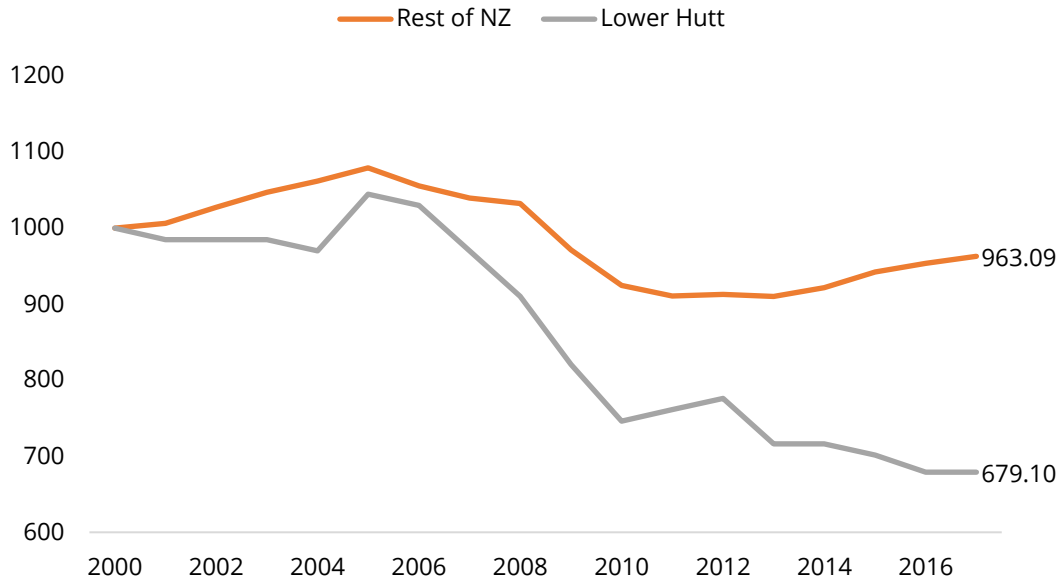
FIGURE 92: LOWER HUTT'S SHARE OF INDUSTRIAL EMPLOYMENT DECLINES
Share of Industrial employment in Wellington region, selected years



Source: Statistics New Zealand, Sense Partners

This decline stems from Lower Hutt's exposure to a declining manufacturing sector. The other growing components of industrial activity lift the relative shares of other districts. But for Lower Hutt, a persistent decline in manufacturing eats away at employment over the forecast period. Figure 93 provides an index of manufacturing employment that shows this exposure clearly. Manufacturing employment in the rest of New Zealand falls rapidly after the GFC but has stabilised and lifted in recent years. In contract manufacturing employment in Lower Hutt falls dramatically and fades away rather than stabilising in recent times.

FIGURE 93: MANUFACTURING EMPLOYMENT IN LOWER HUTT HAS NOT STABILISED
Index of manufacturing employment, year 2000=1000, Lower Hutt vs rest of New Zealand



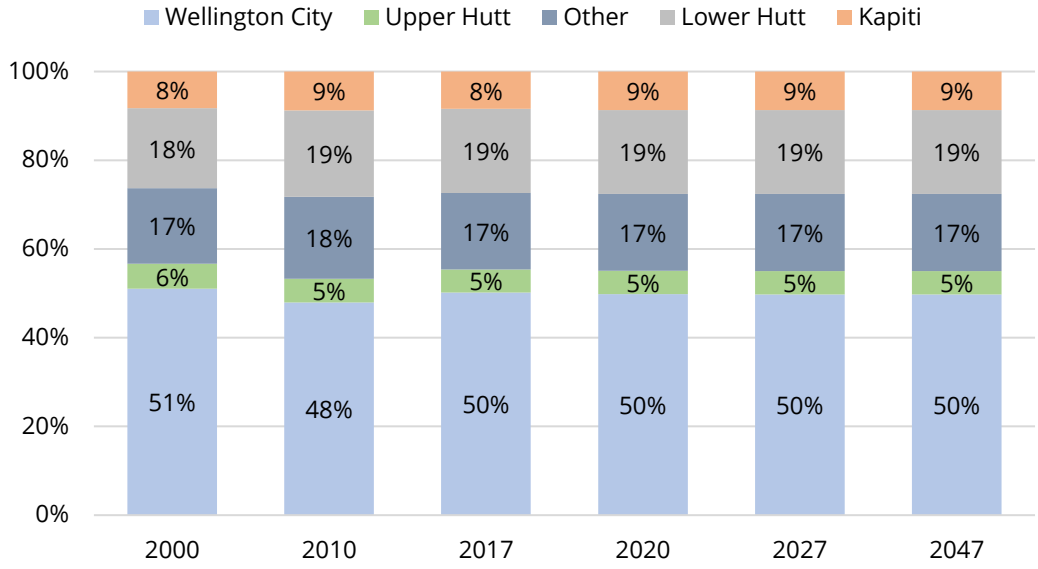
Source: Statistics New Zealand, Sense Partners

Our baseline forecast for retail activity shows stable shares of activity across the region (see Figure 94). Wellington City accounts for half of employment in the sector. Employment in the "Other" category (Porirua, Carterton, Masterson and South Wairarapa) comprises an 18% share with Lower Hutt and Kapiti also posting a share of employment.

The outlook for the retail sector is likely to be contingent on the impact on online shopping that is growing rapidly, albeit from a low base. We will return to this point in stage 3, when we consider the land requirements for different types of retail activity.

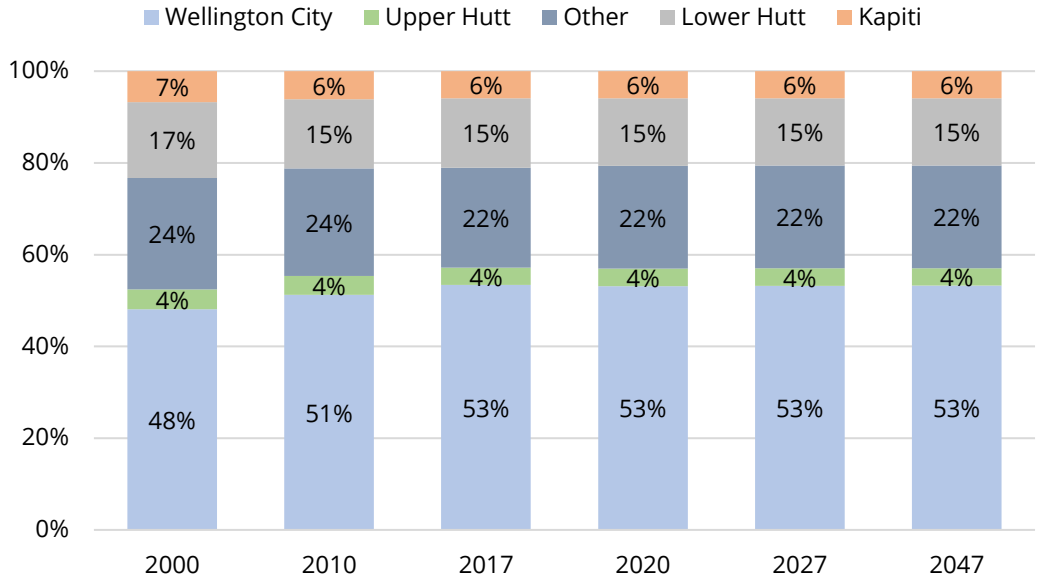
Figure 95 show the outlook for "other" industry employment in terms of share by district. "Other" industries make up 7 percent of total employment in 2017. The shares by district are relatively constant across the forecast horizon.

FIGURE 94: RETAIL EMPLOYMENT IS RELATIVELY STABLE ACROSS THE DISTRICTS
Share of Retail employment in Wellington region, selected years



Source: Statistics New Zealand, Sense Partners

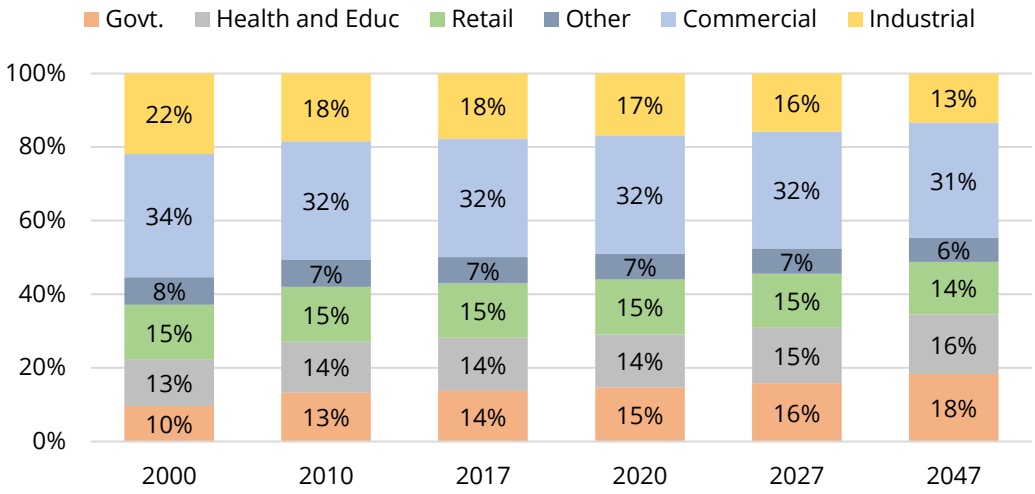
FIGURE 95: DISTRICT SHARES OF "OTHER" INDUSTRY EMPLOYMENT ARE CONSTANT
Share of "Other" employment in Wellington region, selected years



Source: Statistics New Zealand, Sense Partners

Figure 154 to Figure 177 in Appendix 2 show allocations of employment across the region. Understanding the share of employment by industry across the region provides insights into the types of movements in Figure 154 to Figure 177. While many of the shares are relatively constant (commercial and retail for example) Figure 96 shows that the industrial sector declines over the forecast period and is almost 50 percent smaller in thirty years times.

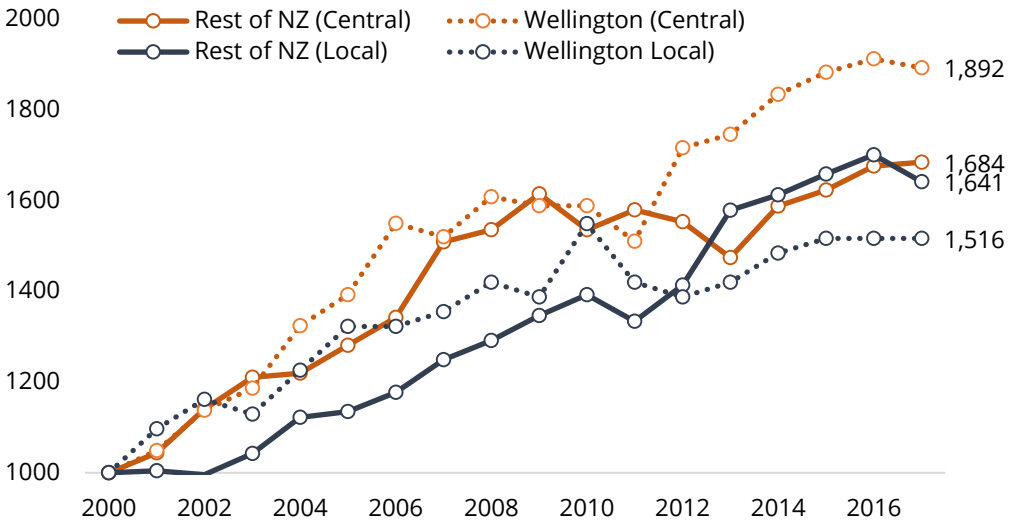
FIGURE 96: GOVERNMENT INCREASES BUT INDUSTRIAL SHARE OF REGION DECLINES
Share of employment in Wellington region, by industry type, selected years



Source: Statistics New Zealand, Sense Partners

In contrast, the government sector increases over time and is a materially larger share of the economy in 30-years' time. Government sector employment is measured here by Public Administration workers which includes local government. Figure 97 takes a closer look at an index of the relative growth of central and local government employment. Central government employment within the Wellington region grows at a faster pace than local government

FIGURE 97: GOVERNMENT INCREASES BUT INDUSTRIAL SHARE OF REGION DECLINES
Index of government employment, year 2000=1000, Wellington region vs rest of New Zealand



Source: Statistics New Zealand, Sense Partners

Our local employment estimates have implications for overall economic activity. We prefer to retain employment to map to business land demand, but we can use productivity assumptions to show how economic activity, as measured by GDP, is likely to develop (see Box A).

Box A: Estimating local output by council

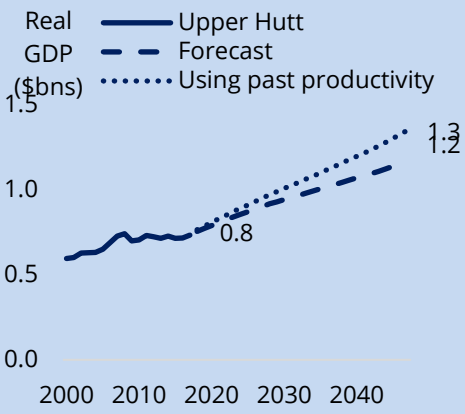
We use MBIE's Modelled Territory Authority GDP (MTAGDP) to obtain GDP estimates that account for initial differences in average earnings across each of the districts. These estimates adjust for commuting movements in and out of the district such that the GDP estimates represent value created in each district rather than value created by residents in each district.

Each council's GDP forecast is from historic local rates of productivity and a forecast where productivity grows at 1%, a little more conservative than Treasury's standard assumption of national productivity growth of 1.5 percent that has been hard to attain recently.

Our estimates show: (i) economic output in Upper Hutt is expected to hit $1 billion by 2035 (see Figure 98); (ii) economic activity in Lower Hutt is expected to increase by $1.1 billion over a 30-year period (see Figure 99); (iii) Kapiti requires a lift in productivity to substantially boost activity (see Figure 100); and (iv) Figure 101 shows that activity within Wellington City is expected to increase by a little over 50 percent over time next thirty years.

FIGURE 98: UPPER HUTT ACTIVITY HITS $1 BILLION BY 2035

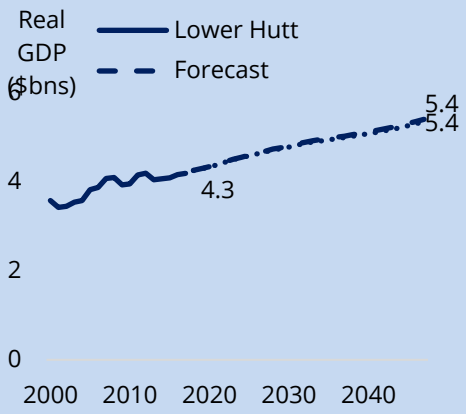
Outlook for real GDP, Upper Hutt



Source: SNZ, Sense Partners

FIGURE 99: EXPECT LOWER HUTT'S FOOTPRINT TO LIFT BY $1.1 BILLION

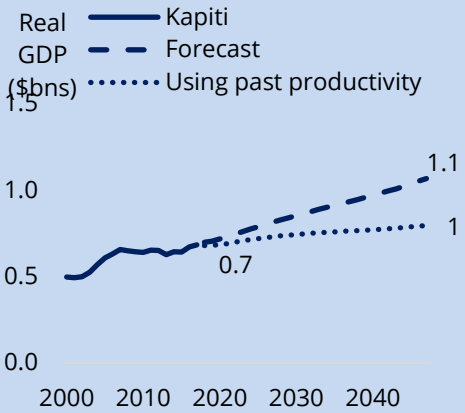
Outlook for real GDP, Lower Hutt



Source: SNZ, Sense Partners

FIGURE 100: TO GROW ACTIVITY KAPITI NEEDS PRODUCTIVITY BOOST

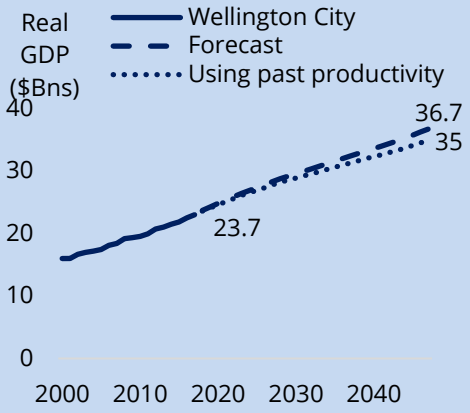
Outlook for real GDP, Kapiti



Source: SNZ, Sense Partners

FIGURE 101: WELLINGTON CITY SET TO LIFT ACTIVITY BY 50 PERCENT

Outlook for real GDP, Wellington City



Source: SNZ, Sense Partners

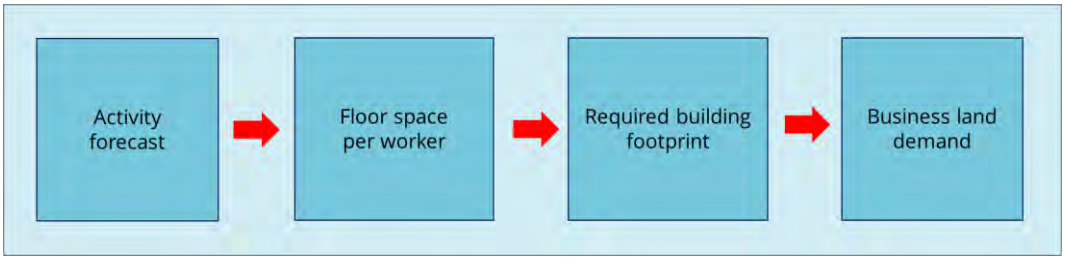
4. Business land demand

4.1Our approach

4.1.1 The general overview

To understand future demand for business land, we use our projections of economic activity developed in section 3 to first map business demand to floorspace area. Then we turn the demand for floorspace, via an assumed building footprint, into an estimate of demand for business land. Figure 102 provides an overview of these steps.

FIGURE 102: WE USE A STAGED APPROACH TO FORECAST BUSINESS LAND DEMAND
Stylised approach to forecasting activity in section four



Source: Sense Partners

We assess demand at the regional level. We start from the premise that firms can and do switch locations within the region, so any assessment of demand needs to be made at an aggregate level. Once we have quantified demand for floorspace and land, we then allocate floorspace and land demand across each of the local councils. This is based on a simple model where firms respond to different demand and supply signals, calibrated to the existing spatial location of firms across the region.

As use of business land differs across industries, we need to project the economic shape of the regional economy. We also want to model where businesses would locate across the region. So we need a projection that allows activity to move across districts. We also need a projection that can be mapped back to Statistics New Zealand's projections for population growth rate as a benchmark.

There are considerable uncertainties when considering the economic conditions that guide firms' location choices over the next 3, 10 and 30 years. To tease out the more likely developments, we pursue two sets of scenarios, designed to address the more substantive issues. These include:

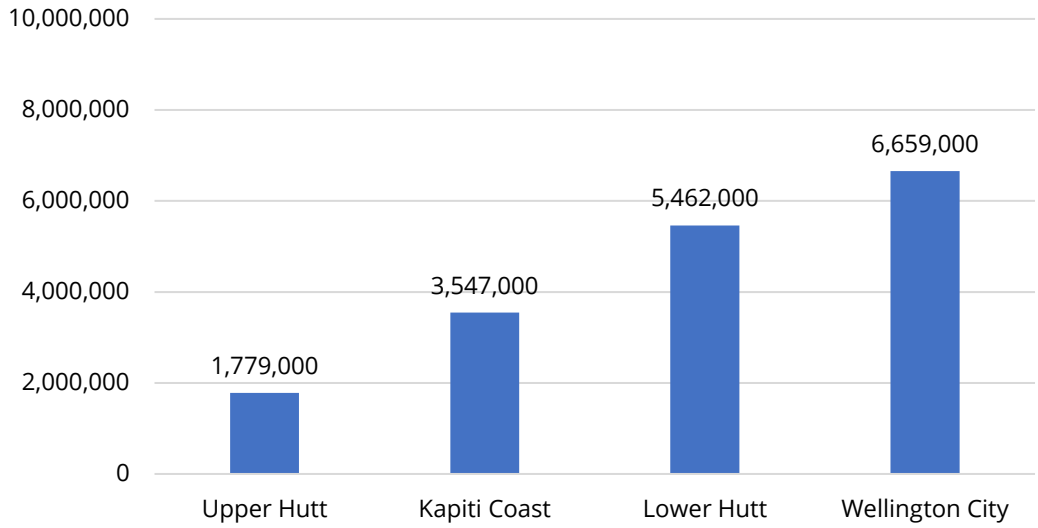
1. Stronger population growth than envisaged by Statistics New Zealand (see section 4.4)
2. Improved access to the region from the Northern corridor (see section 4.5).

4.1.2 The current state

Business land and floorspace

Business land is dispersed across the Wellington region. Commercial and office activity dominates Wellington City, while industrial land is concentrated in Lower Hutt and Upper Hutt. Kapiti Coast contains a mix of activity. Retail activity is spread across all four councils. Lower Hutt and Wellington City contain the most business land (see Figure 103).

FIGURE 103: LOWER HUTT AND WELLINGTON CITY HOLD THE MOST BUSINESS LAND
Business land across the Wellington region by local councils in the study area



Source: Sense Partners and MR Cagney estimates

Activity type matters a lot. MBIE and the Ministry for the Environment (see the National Policy Statement on Urban Development Capacity 2017) suggests allowing for the following business space per worker:

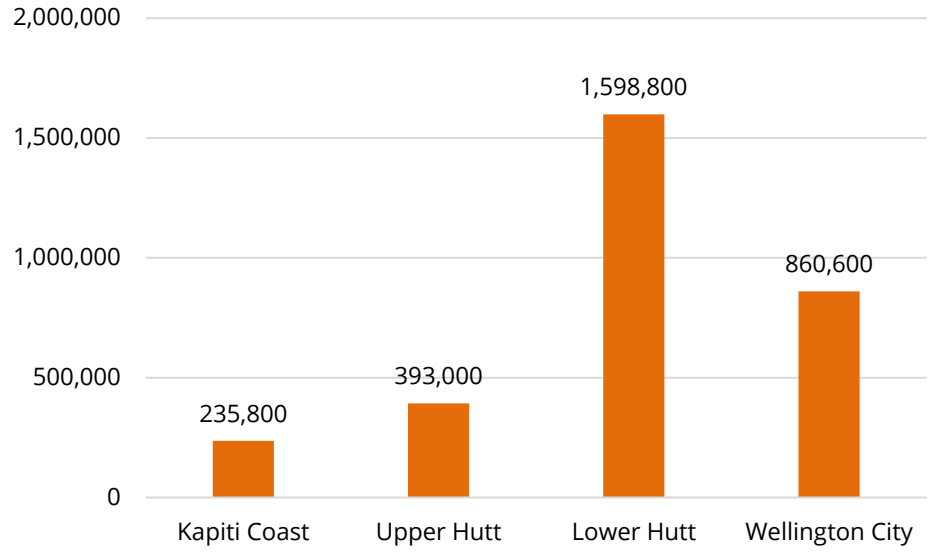
- Office: 15-20 square metres
- Retail: 30-50 square metres
- Industrial: 100-170 square metres

In addition, different business activity impacts on the building footprint, in terms of floorspace (i.e. floors) per square meter of business land. Lower Hutt has a greater share of industrial land than Wellington City (see Figure 105). But industrial land is of lower intensity, in terms of area per worker and floors to land, than commercial office space or retail activity.[6] By comparison the intensity of business floor area to business land ratios and intensity of workers to business floor area, make the Wellington CBD one of the most intensely populated business districts in New Zealand. The Lambton Quay area accommodates almost 60,000 workers, or about 2 workers for every 3 square metres of business land.

[6] Retail workers require only a third as much floorspace as industrial workers.

FIGURE 104: INDUSTRIAL ACTIVITY USES SUBSTANTIAL LAND

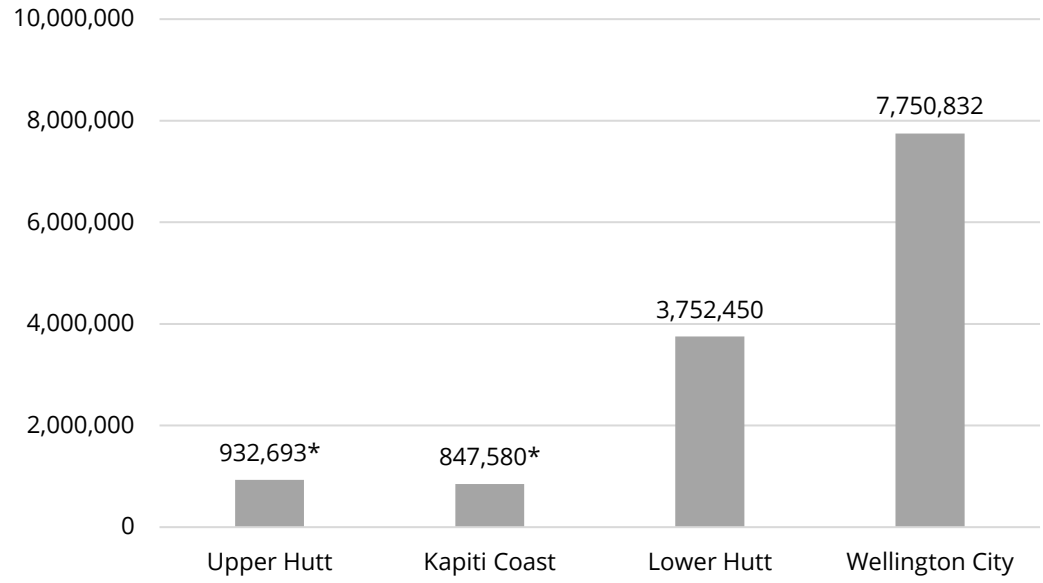
Industrial land by local council within study area



Source: Urban Economics (2016)

FIGURE 105: WELLINGTON CITY CONTAINS THE MOST FLOOR SPACE IN THE REGION

Total floor space by local area, all business land types



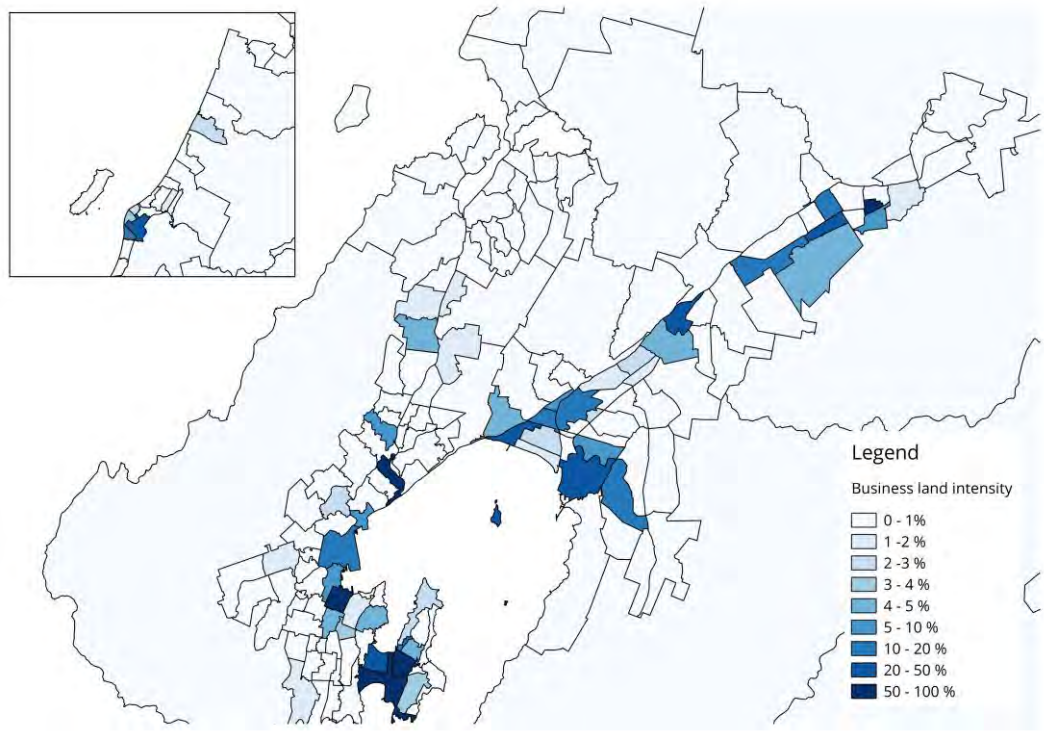
NB. * Denotes estimates based on LIDAR data rather than floorspace area records.

Source: Sense Partners and MR Cagney estimates

Zoning

To show the location of business land across the region, we map the fraction of business land by suburb using Statistics New Zealand's area unit as a definition of the suburb. The map in Figure 106 shows that business land is currently in a handful of locations and that Wellington's CDB is an extremely dense location of business activity.

FIGURE 106: WELLINGTON'S CBD IS AN INTENSE AGGLOMERATION OF WORKERS



Source: Statistics New Zealand, Sense Partners

Council zoning rules impact on the location of business land and what type of business can locate there.

While some zoning aims to avoid or minimise spill-overs from activities (such as by separating heavy industrial use from residential use), in other cases zoning allows both certain business use and residential use.

Thus zoning needs to be taken into account in our projections. Each council has its own zoning rules, which complicate the modelling. See Figure 182 in the Appendix for a detailed list.

4.2 Mapping Activity to Floorspace

4.2.1 Approach

To project future business demand for land, we need to connect our activity projections to business land use. As an intermediate step, we first map activity back to estimates of floor space demand and then map floor space demand to land demand.

Mapping economic activity to floor space demand means taking our forecasts of employment for the region and applying a forecast for the footprint, or floorspace, per worker. Since there is no consistent time series for footprint per worker, we use information from many sources to calibrate our projection. These include:

- over a specific period, the ratio of consents, by activity in the Wellington region, to the growth of employees – a signal of the capacity required to house additional workers
- explicit guidance on likely bounds from the National Policy Statement on Urban Development Capacity. These are expectations rather than standards.
- sector reports, for example the Government Property Group's Crown Office Estate Report and local commercial real estate reports
- sense checking estimates against trends, where we do have consistent data over time, such as international trends in office space per worker
- one-on-one discussions with business representatives
- discussion in a group setting with councils to test thinking.

Since there is limited data on footprint per worker, the assumptions we work with contain some uncertainty. However, the estimates are better than relying on the ranges supplied by the NPS-UDC, as these ranges miss local factors and trends over time.

4.2.2 Calibrating the footprint of economic activity

We work with six categories of economic activity – government, commercial, retail, industrial, HET (Health, Education and Training), and a catch-all 'other'. While the *economic* drivers of these categories are different, similarities in footprint per worker exist for some of the categories. For example, we expect broad similarities between the office space required per worker for government employees and the private sector, which we confirmed with international estimates and the estimates provided by the Government Property Group.

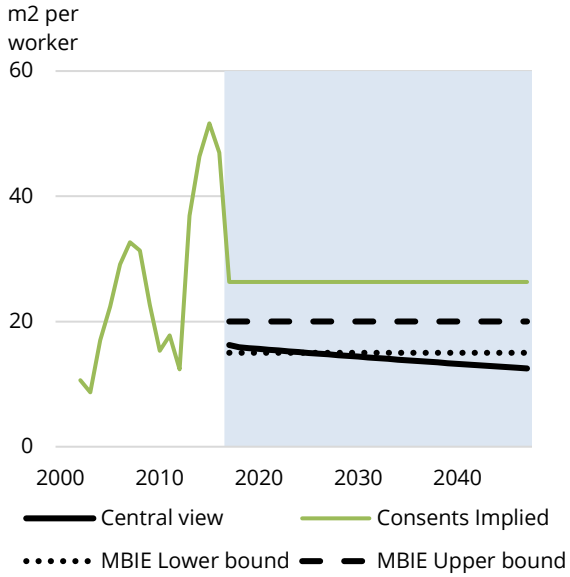
Government and commercial

Since we have no lengthy time series data on office space per worker, we use several data sources to calibrate our assumptions. We first look at the history of consented office floor space. We compare consented floorspace in the sector to additional workers in the sector as a guide to the floorspace needed to accommodate additional workers in the future.

Figure 107 and Figure 108 show that the 5-year average of consented floor space per workers is reasonably volatile. In any year, consented activity will not match realised floorspace one-for-one. But over a sufficiently long period, the average provides a reasonable guide.

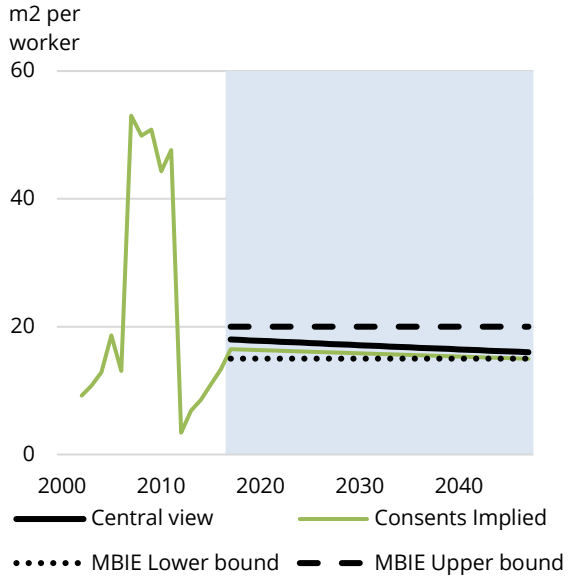
The Government Property Group provides an estimate of office space per government worker as a target range of 12-16 square metres. That range is a little higher than international comparisons for major cities where space is at a premium, so the central view we use slowly reduces office space per government worker from the current point of 17 square metres per employee to 14 square metres, the midpoint of the government target, in 30-years' time.

FIGURE 107: WORKER SPACE: GOVERNMENT



NB. Consent history is a 5-year moving average

FIGURE 108: WORKER SPACE: COMMERCIAL



NB. Consent history is a 5-year moving average

In comparison, private sector office space per worker is, at 16.5 square metres, slightly higher than the public sector at present. We reduce the rate of intensification more slowly, running office space per worker to 15 square metres, the bottom of the NPS-UDC guidance by the end of the forecast period.

While the increase in intensity looks small in absolute terms, our assumption represents a 10 percent reduction in space requirements over the 30-year period. This flows directly in our projection for business land demand. If office space per worker does not intensify at the rates we suggest, then additional business land would be required.

Mild increases in the intensity of the use of office space is entirely consistent with international experience in the past 2-3 years and the impact of technology. With desk occupancy around 30-40 percent, hot-desking is increasingly in focus with more demand for shared spaces. Expect these technology trends to continue.

Retail and Industrial

Retail workers require more space than office workers and trends in consents per additional retail worker, and the NPS-UDC guidance that suggests 30-50 square metres, guide us here.

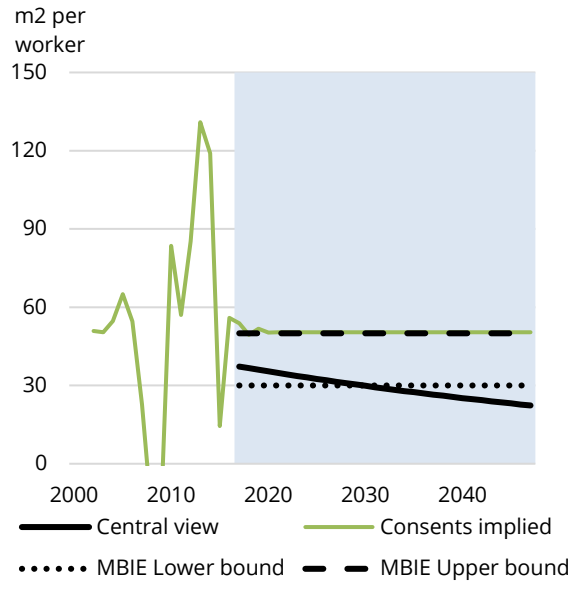
The nature of retail is changing. Increasing demand, over past decades, means Increased demand for online-shopping makes for direct competition now large format retail now competes with. While US retail space is focussed on densifying existing spaces with little new investment, the starting point for US retail space per household is many multiples higher for the US than New Zealand (see JLL 2017).

Rather than a decline, we expect demand for retail floorspace to grow more slowly in future than it has in the past. Improvements in logistics are likely to reduce, rather than increase floorspace required, as storage is increasingly pushed to shared warehouses or rapid delivery models. While the rate of decline from the current retail space per worker, from 37 to 25 square metres per worker may appear steep, the decline is approximately one percent per annum. Figure 109 shows our assumption for retail floorspace required per worker.

Industrial land carries the largest footprint per worker. While the industrial sector is relatively small in the Wellington region, the space requirements have a large impact on land needs. Consented floorspace per worker provides little guidance, with the average significantly greater than the NPS-UDC range.

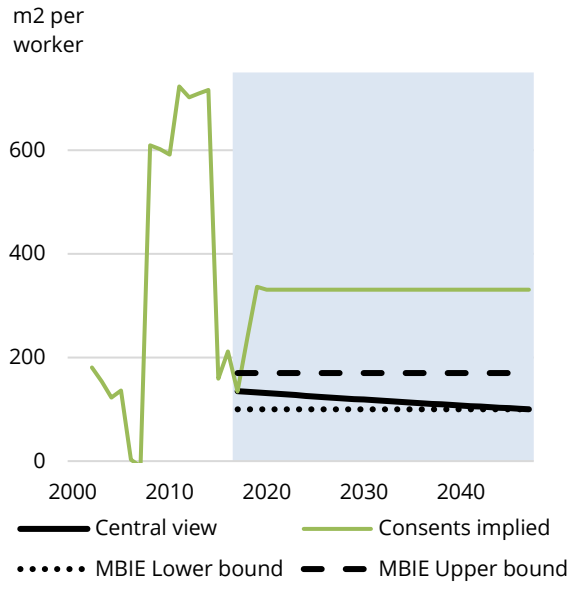
Increasingly, new uses of industrial land in the Wellington region tend to be associated with logistics and light manufacturing such as digital printing and food manufacturing. These activities do not have the same space requirements as heavy industrial activity and we gradually increase the intensity of industrial activity within our forecast (see Figure 110). Although this reduction from the current industrial floorspace per worker or 150 square metres to 100 square metres occurs only gradually, the impact on total land is substantial.

FIGURE 109: WORKER SPACE: RETAIL



NB. Consent history is a 5-year moving average

FIGURE 110: WORKER SPACE: INDUSTRIAL



NB. Consent history is a 5-year moving average

Health, Education and Training and Other

Health, education and training workers form a substantive part of the Wellington regional economy. Understanding the floorspace requirements for this sector is important for business space requirements across the region.

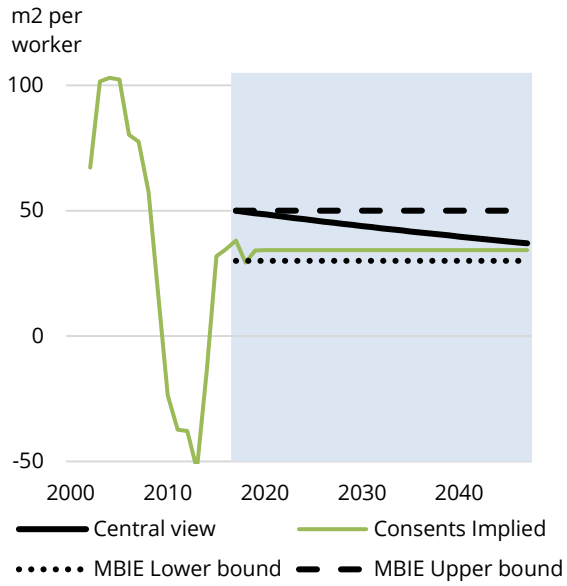
The sector is diverse and includes a tertiary sector located in both office and single storey buildings, primary and secondary schools managed by central government, and health care providers that will become increasingly important as the region ages.

Consenting activity provides little guidance for this sector. Consenting tends to be very lumpy with substantive projects interspersed with small projects.

The consented average footprint for the sector is close to retail. We consider the bounds provided by the NPS-UDC for retail as having some information content for this sector. We expose the sector to modest intensification over the forecast period and hit 100 square metres per worker by 2047.

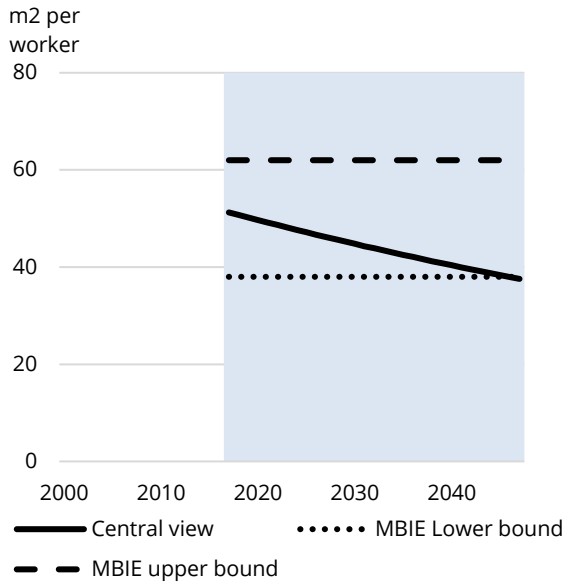
We also require an assumption for other workers that span a variety of industries. We assume a modest decline in land required for each worker. The sector intensifies from approximately 50 square metres per worker to 38 square metres by the end of the forecast period. This is the average of our assumptions across the other sectors.

FIGURE 111: WORKER SPACE: HET



NB. Consent history is a 5-year moving average

FIGURE 112: WORKER SPACE: OTHER



NB. Consent history is a 5-year moving average

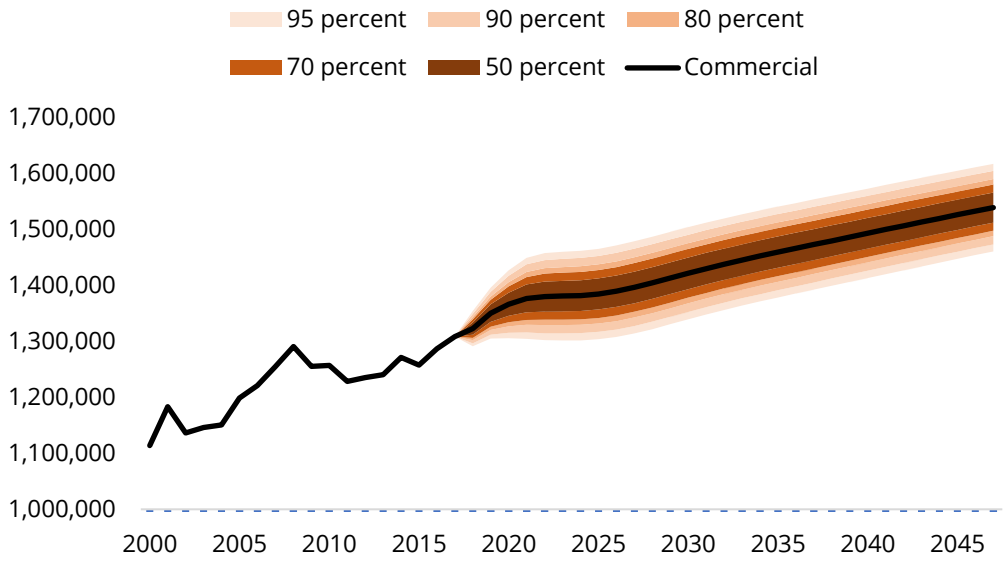
4.2.3 Demand for floorspace

Combining our forecasts of economic activity across the region with our assumptions for the floorspace required for each worker gives our forecast for total floorspace. Initially, we ignore businesses decisions about where to locate within the region and work with a regional floorspace forecast.

Commercial

Figure 113 shows our forecast for how demand for commercial floorspace evolves. From an estimated 1.3 million square metres in 2016, we expect demand to hit 1.55 million square metres in 2047.

FIGURE 113: COMMERCIAL FLOORSPACE DEMAND GROWS DESPITE INTENSIFICATION
Wellington Region, Demand for floorspace, 2000-2047, Commercial



Growth is stronger in the next five years – about 1.4 percent per annum – before slowing to about 0.5 percent per annum by 2047. The slowing of the rate of growth is driven by slow population growth in later periods, based on the Statistics New Zealand medium population projections.

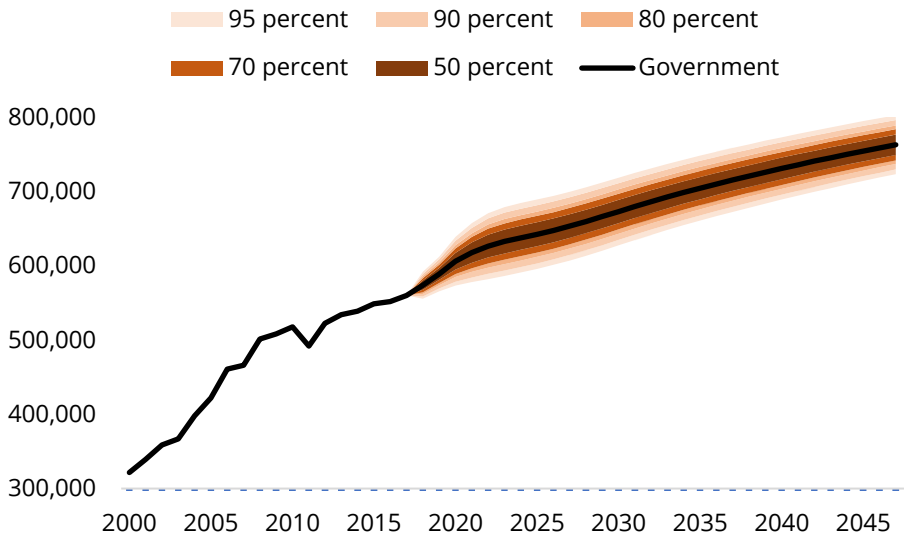
Our forecasts for economic activity from our economic model capture uncertainty about how the regional economy will evolve. We allow that uncertainty to carry through and impact on our floorspace forecast.

But there are many other factors that impact on the outlook. These include the interplay between supply and price, increasing costs of building up, and difficulties with earthquake remediation. These factors drive additional uncertainties that can change demand for business land. Councils will need to update estimates when these factors present.

Government

Figure 114 shows our projection for floorspace demand for the Government sector. This includes central and local government. From an estimate of about 400,000 square metres in 2016 the Government sector is set to grow to 550,000 square metres by 2047.

FIGURE 114: EXPECT GOVERNMENT TO REQUIRE MORE FLOORSPACE
Wellington Region, Demand for floorspace, 2000-2047, Government



Assumptions on the space required per worker have a marked effect on the outlook. If we keep the footprint per worker static at the current requirement, then the sector requires 720,000 square metres by 2047 – an increase of 72 percent.

Implicitly, our forecast assumes no change in how government chooses to situate activity. While our forecast has stronger growth in the next few years, it also focuses on averages rather than trying to pick cycles in government spending. So councils should plan on the basis of the range of outcomes rather than the precision implied by our central forecast.

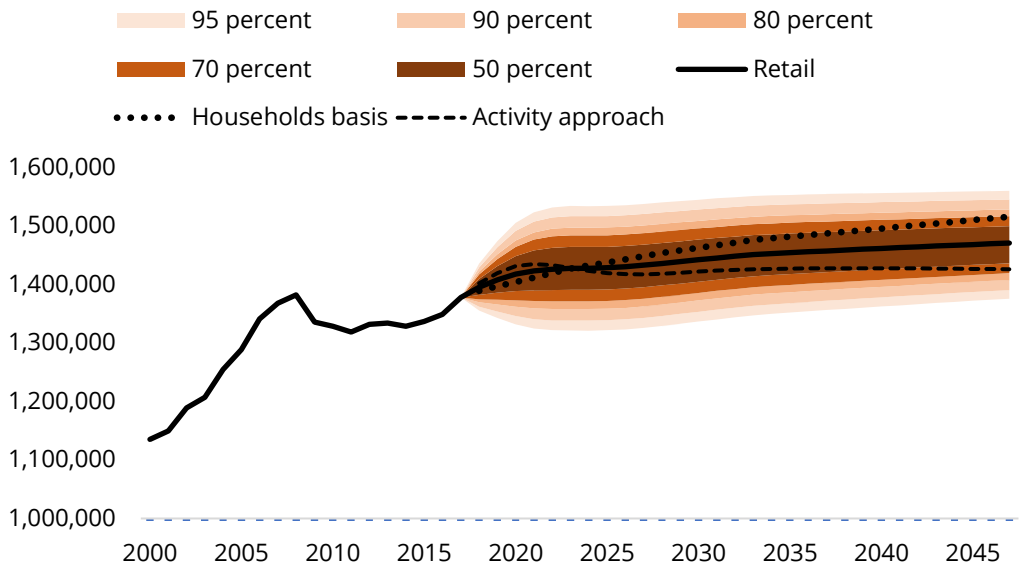
Retail

The outlook for retail is complicated by a change in technology that promotes on-line shopping and next-day delivery over traditional retailing. However, tt is easy to overstate the impacts. Right now, traditional retailing dominates online spending that accounts for about $4.4 billion or around 5% of total retail sales (see BNZ Online Retail Sales, 15 January 2018).

To help triangulate our assumptions, we augment our assessment of retail with a forecast based on the number of households in the region. The guidance on the National Policy Statement on Urban Development Capacity suggests a benchmark of 7 square metres of retail floorspace per household. So, we also construct a projection of retail floorspace on a per household basis, based on Statistics New Zealand's forecast of the number of households in the region.

Figure 115 shows the forecast based on households (dotted line) is a little stronger than our forecast based on the economic activity (dashed line). We calculate the average of the two approaches and this informs our central view on retail activity. This average implies retail space would hit 1.47 million square metres by 2047. That represents a ten percent increase in floorspace over the entire period.

FIGURE 115: DEMAND FOR RETAIL FLOORSPACE GROWS MODESTLY
Wellington Region, Demand for floorspace, 2000-2047, Retail



More material impacts of online activity on traditional retail would switch demand from retail towards industrial spaces that could be used for warehousing and logistics.

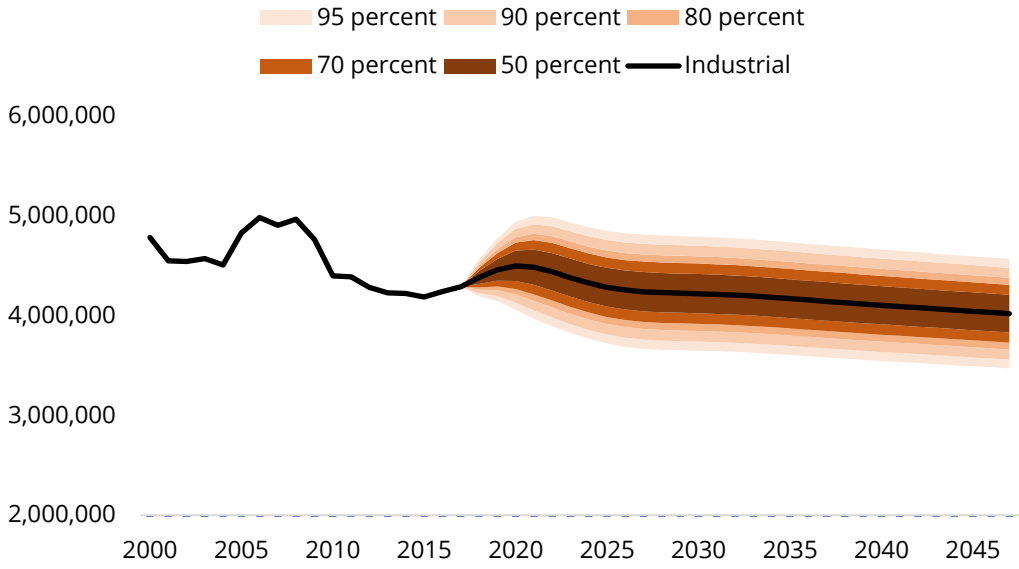
Councils will need to monitor how retail demand develops to ensure planning is appropriate for this sector and the wider community.

Industrial

In the near-term industrial land demand grows a little, reflecting a recent lift in activity. But over the long-term, the shift from industrial activity towards services, and our assumption that the floorspace required for each industrial worker declines, produces a mild decline in the demand for industrial floorspace.

Our projection for demand for industrial land is shown in Figure 116.

FIGURE 116: A CONTINUED SLOW DECLINE IN DEMAND FOR INDUSTRIAL LAND SPACE
Wellington Region, Demand for floorspace, 2000-2047, Industrial



There are upside risks to our projection. Recent activity in the sector around logistics and food manufacturing show the potential for growth within the industrial sector that has lifted a little since the trough in activity in 2014.

Resilience to earthquakes and sea-level rise are also changing the landscape for industrial land across the region. Anecdotal evidence suggests international investors are increasingly wary of locations exposed to geotechnical risks. These factors are rapidly changing the price of industrial land in different locations as firms choose different locations within the region.

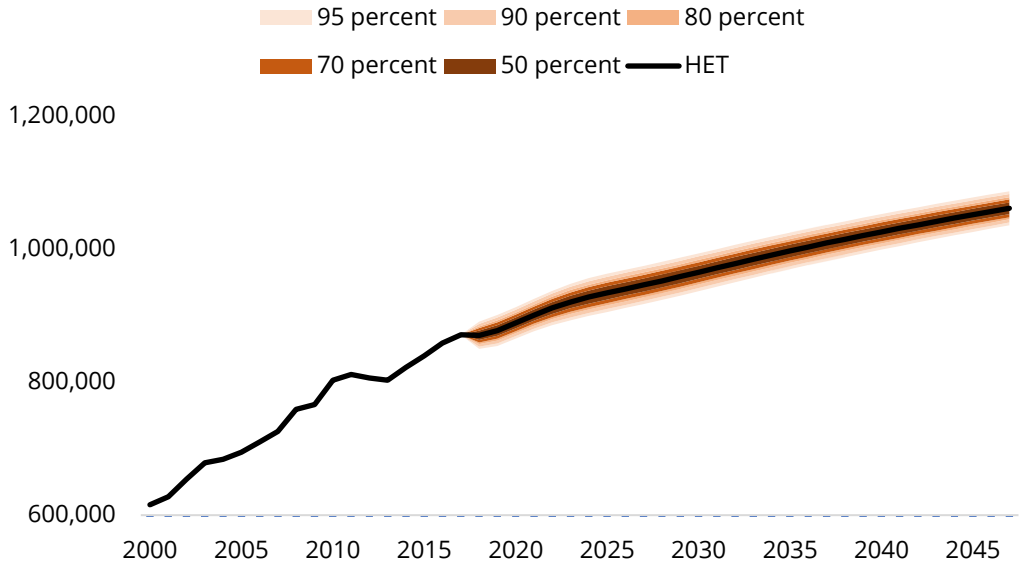
Health, Education and Training

Our projection for demand for land in the Health, Education and Training sector is relatively strong compared with other sectors. Our projection for economic activity suggests many more workers in this sector as the population ages and increased incomes lift consumption of health services. We expect activity in the education sector to continue to be buoyant, supported by growth in the tertiary sector over the forecast period.

Changes in floorspace for health, education and training tends to move in large chunky increases when infrastructure projects for hospitals or expansions of tertiary institutions are put in place. When assessing capacity, councils may well want to assess the current state of health and education facilities relative to our assessment of needs.

Over the projection horizon, we expect demand for floorspace to grow by 216,000 square metres, comprising a 25 percent increase over 30 years.

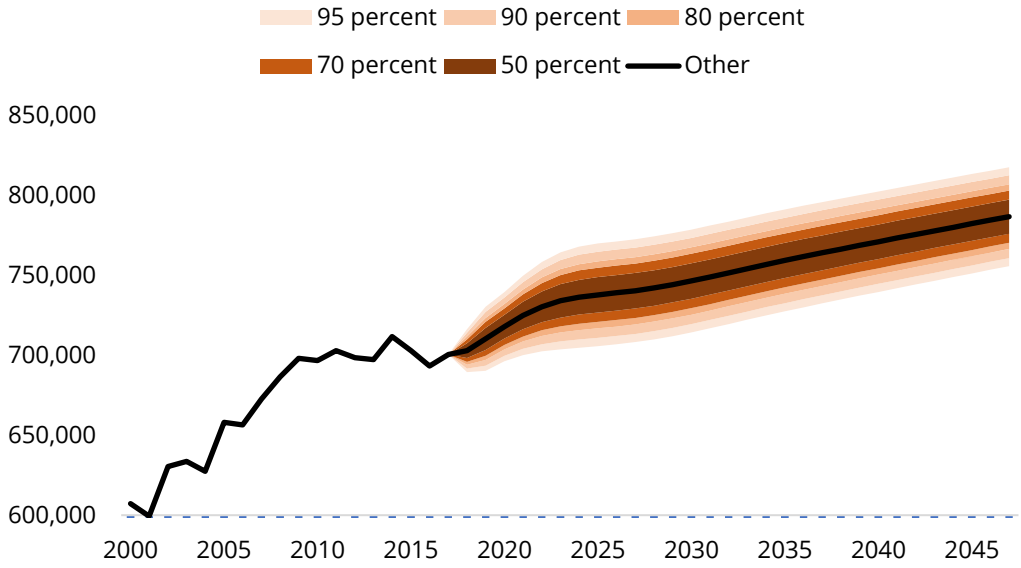
FIGURE 117: EXPECT STRONG HEALTH, EDUCATION & TRAINING FLOORSPACE DEMAND
Wellington Region, Demand for floorspace, 2000-2047, Health, Education and Training (HET)



Other

Our catch-all "other" category suggests 12 percent growth in floorspace in demand over the next 30 years, requiring an additional 86,000 square metres by 2047. We assume modest increases in the intensity of the use of space that are average increases in intensity of our regular categories.

FIGURE 118: MODEST FLOORSPACE DEMAND GROWTH FROM OTHER FIRMS IS LIKELY
Wellington Region, Demand for floorspace, 2000-2047, Other



4.3 From floorspace to land

4.3.1 Approach

To move from floorspace to demand for business land, we need to use a FAR (floor-to-area ratio) to convert floorspace to demand for land. In addition, to understand how much additional land might be required, we first need to know the existing stock of business land.[7] With a floor-to-area ratio in hand, we can then use our floorspace projections to quantify demand for business land across the region.

4.3.2 Data and methodology

Our analysis relies upon 4 key sources of data, provided by councils in GIS shapefile format:

- Land Information New Zealand (LINZ) data was used to identify the location and shape of parcels, as well as the number of property titles associated with each parcel
- Council zoning maps, as at late 2017, were used to identify the zoning of each individual parcel and hence to identify sites that are zoned for business use
- LIDAR (light detection and ranging) data on building footprints identify the area covered by buildings, and (for Wellington and Lower Hutt) the height of buildings
- Ratings database information provided additional information on property values and (for Wellington,Lower Hutt and Kapiti) the amount of floorspace on each site.

Figure 119 summarises the data sources we used to identify the level of development on business-zoned sites, and (to some degree) the allocation of uses within buildings. Some GIS data required extensive checking and cleaning prior to use (see Appendix 3).

FIGURE 119: DATA SOURCES TO EVALUATE BUSINESS ZONED LAND DEVELOPMENT

Data source	Wellington City	Lower Hutt	Upper Hutt	Kapiti Coast[8]
Site area	Yes	Yes	Yes	Yes
Zoning	Yes	Yes	Yes	Yes
Building footprints	Yes	Yes	Yes	Yes
Building height	Yes	Yes		
Number of titles	Yes	Yes	Yes	Yes
Land relative to capital values	Yes	Yes	Yes	Yes
Total floorspace	Yes	Yes		Yes

Source: Local councils

[7] The charts in section 3 combine activity with our floorspace requirements per worker to estimate current floorspace use by our industrial groupings.
[8]Kapiti also provided further property and GIS information to support analysis of measures and fill gaps from sources identified above.

4.3.3 Stock of zoned land in each council

Before moving to estimating demand for business land we need to first understand the existing stock of business land, including:

- the average degree of development on existing sites
- the development level of sites in different locations, (using ratings valuation data)
- building footprints (using LIDAR data).

Figure 120 breaks down land according to the current level of development. Land to Capital values, the LV/CV ratios, categorise sites according to how 'developed' they are. A low LV/CV ratio indicates improvement values make up most site valuations. A high LV/CV ratio indicates a site is vacant or home to small or low-value developments. This indicates:

- Wellington City's business-zoned sites are more likely to have low LV/CV ratios – 6% of sites have ratios under 0.2 (where buildings make up more than 80% of the value of the site), and another 31% have ratios under 0.4.
- However, 19% of business-zoned land in Wellington City has a ratio over 0.8, indicating that land makes up the majority of site value.
- Lower Hutt has less land with a low LV/CV ratio and more with a high ratio – 27% of land has a LV/CV ratio over 0.8.
- Business land in Upper Hutt is more likely to have a low level of development – 37% of land has an LV/CV ratio over 0.8
- For Kapiti, a third of business land by area is over 0.8 but a third of land is between 0.6-0.7, which comes from town centre and industrial uses.

Figure 121 summarises the total quantity of zoned land, by council area. We exclude sites under 200 square metres since these sites appear to be 'slivers' of undevelopable land like berms.[9]

LIDAR data also provides information on site coverage ratios and floor area ratios.

In general:

- Site coverage ratios (SCR) are higher in Wellington City and Lower Hutt than in Kapiti Coast or Upper Hutt. (Wellington's average SCR is 0.39, excluding the large Airport zone.) This suggests either:
    a. there is more undeveloped land in the latter councils, or
    b. development intensity is generally higher in inner areas.

[9] There were around 2,200 sites under 200m2, comprising 29% of the total business-zoned sites in the dataset. However, they only accounted for 1.3% of the total land area and hence their exclusion is immaterial to the results.

- Estimated building heights are generally higher in Wellington City than in Lower Hutt. In Lower Hutt, average building heights are two storeys or less in most zones.
- Average lot sizes are generally larger in industrial zones than in commercial or centre zones. This reflects demand for larger floorplates for industrial activities.

These results provide a guide to the quantity of business-zoned land and the level of existing development in different locations. These results can be filtered further to drill further into the characteristics of business-zoned land.

FIGURE 120: LV/CV RATIOS VARY SPATIALLY ACROSS THE REGION
Distribution of LV/CV ratios for business land in Wellington councils

TA / zone	LV/CV ratio						Total land
	0.0 - 0.2	0.2 -0.4	0.4 -0.6	0.6 -0.8	0.8 -1.0	Missing	
Kapiti Coast District	**2%**	**19%**	**29%**	**20%**	**26%**	**3%**	**362**
Airport Zone	0%	20%	20%	20%	0%	40%	127
District Centre	6%	20%	26%	18%	24%	6%	69
Industrial	2%	22%	25%	19%	30%	2%	115
Local Centre	9%	22%	39%	26%	4%	0%	5
Outer Business Zone	1%	12%	36%	21%	29%	1%	26
Town Centre	1%	19%	32%	22%	22%	3%	20
Lower Hutt City	**1%**	**15%**	**28%**	**24%**	**27%**	**4%**	**546**
Avalon Business	0%	41%	6%	44%	9%	0%	10
Central Commercial	14%	20%	31%	16%	17%	2%	37
General Business	0%	11%	30%	19%	36%	3%	294
Petone Comm. - Area 1	3%	23%	26%	37%	10%	1%	6
Petone Comm. - Area 2	0%	18%	38%	20%	22%	2%	29
Special Business	1%	16%	23%	37%	16%	7%	149
Special Commercial	0%	0%	10%	14%	76%	0%	1
Suburban Commercial	3%	26%	43%	19%	8%	2%	21
Upper Hutt City	**6%**	**21%**	**16%**	**14%**	**37%**	**6%**	**178**
Business Commercial	6%	37%	15%	15%	26%	2%	45
Business Industrial	6%	16%	16%	14%	41%	7%	133
Wellington City	**6%**	**31%**	**18%**	**19%**	**19%**	**7%**	**666**
Airport	3%	67%	2%	26%	2%	0%	146
Business 1	7%	21%	22%	17%	33%	1%	67
Business 2	8%	28%	28%	4%	32%	0%	148
Central Area	8%	17%	16%	24%	17%	19%	233
Centre	1%	20%	33%	20%	25%	1%	71
Curtis St Business	0%	0%	0%	0%	100%	0%	1
Grand total							**1752**

Source: Local councils

Lastly, we use LIDAR data to show how intensity of development varies within the largest zones in each council. This illustrates variation in development outcomes in each area.

FIGURE 121: SUMMARY OF BUSINESS-ZONED LAND BY COUNCIL AND BUSINESS ZONE

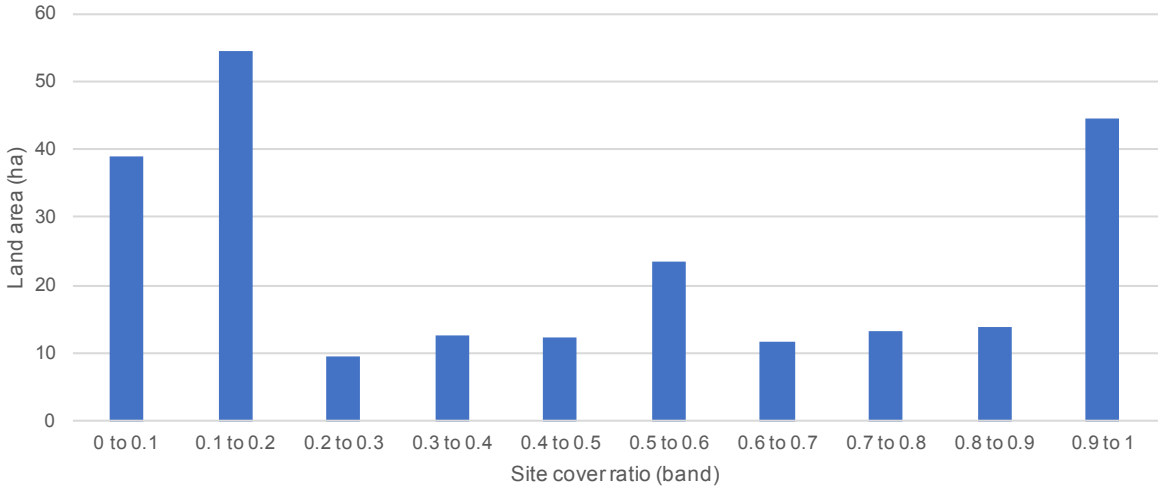
TA / zone	Number of parcels	Total land area (ha)	Total floor area (LIDAR estimate)	Total building footprint (LIDAR)	Average parcel size (m2)	FAR-LIDAR	SCR-LIDAR	Implied average building height
Kapiti Coast District	**946**	**354.7**	**489,731**	**451,079**	**3,750**	**0.13**	**0.13**	
Airport Zone	12	126.6	29,493	30,279	105,504	0.02	0.02	
District Centre	58	68.7	88,854	77,704	11,852	0.12	0.11	
Industrial	422	102.0	205,560	205,336	2,416	0.18	0.20	
Local Centre	25	5.0	10,000	8,162	1,981	0.20	0.16	
Outer Business Centre Zone	133	32.0	42,873	47,809	2,408	0.16	0.15	
Town Centre	296	20.4	112,951	81,788	690	0.55	0.40	
Lower Hutt City	**2,475**	**546.2**	**3,752,450**	**1,997,040**	**2,207**	**0.69**	**0.37**	**1.9**
Avalon Business	48	9.5	133,846	26,224	1,988	1.40	0.27	5.1
Central Commercial	386	36.6	503,565	228,024	949	1.37	0.62	2.2
General Business	1,119	294.1	1,657,323	910,536	2,628	0.56	0.31	1.8
Petone Commercial - Area 1	145	6.1	67,654	39,082	421	1.11	0.64	1.7
Petone Commercial - Area 2	249	28.5	296,648	154,302	1,145	1.04	0.54	1.9
Special Business	224	148.7	999,166	535,330	6,639	0.67	0.36	1.9
Special Commercial	3	1.2	5,475	5,475	3,912	0.47	0.47	1.0
Suburban Commercial	301	21.5	88,775	98,066	714	0.41	0.46	0.9
Upper Hutt City	**841**	**177.9**		**496,376**	**2,116**		**0.28**	
Business Commercial	492	45.3		180,326	920		0.40	
Business Industrial	349	132.6		316,050	3,801		0.24	
Wellington City	**3,305**	**665.9**	**7,750,832**	**2,138,473**	**2,015**	**1.16**	**0.32**	**3.6**
Airport	50	146.1	347,683	102,313	29,218	0.24	0.07	3.4
Business 1	315	66.9	546,022	275,456	2,122	0.82	0.41	2.0
Business 2	230	148.1	670,205	320,140	6,439	0.45	0.22	2.1
Central Area	1,691	233.1	5,634,178	1,068,155	1,378	2.42	0.46	5.3
Centre	1,012	70.7	552,744	372,410	699	0.78	0.53	1.5
Curtis St Business	7	1.1	0	0	1,559		0.00	
Grand total	**7,567**	**1,745**		**5,082,968**	**2,306**		**0.29**	

Source: Local councils

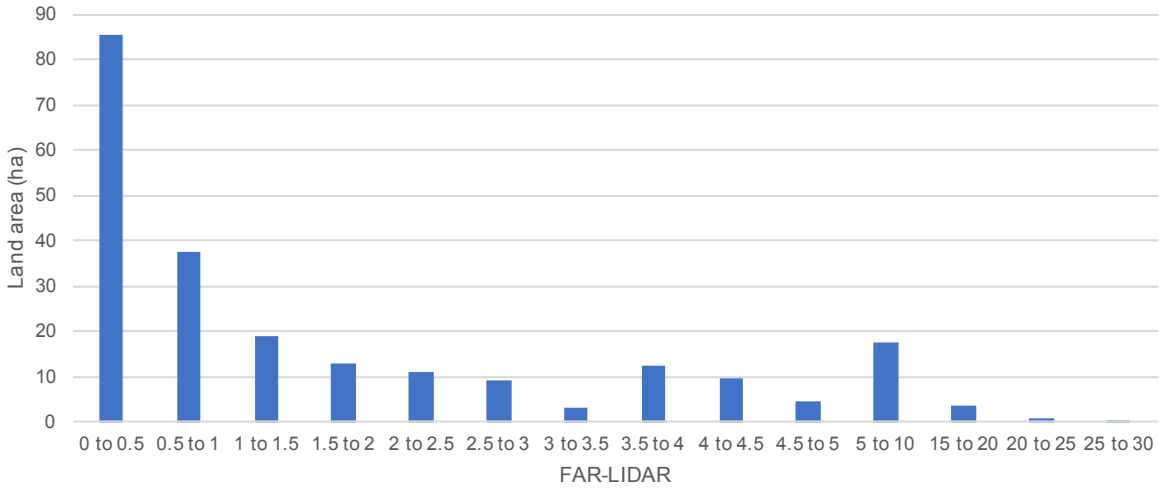
Figure 122 shows the distribution of the site-cover ratio and the FAR-LIDAR measure for Wellington's Central Area. Note that, even in this highly developed area, there are many sites with low FARs, and low site coverage. This may reflect vacant sites in the area, or some errors with the underlying data, that we have not been able to identify.

FIGURE 122: DISTRIBUTIONS OF BUSINESS LV/CV RATIOS FOR WELLINGTON CITY

Panel A: Distribution of site cover ratio



Panel B: Distribution of FAR-LIDAR



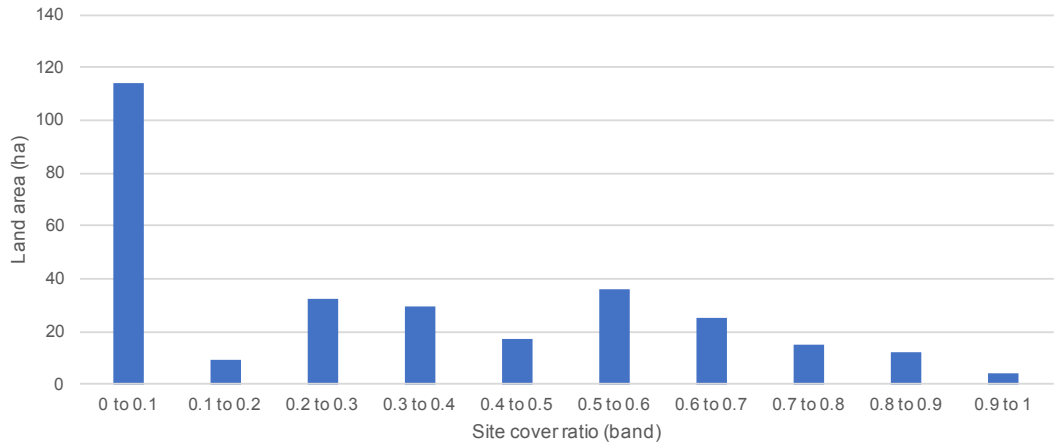
Source: Local councils, MRCagney

Figure 123 shows the distribution of these measures in Lower Hutt's General Business zone, which accounts for over half of the business-zoned land in this area.

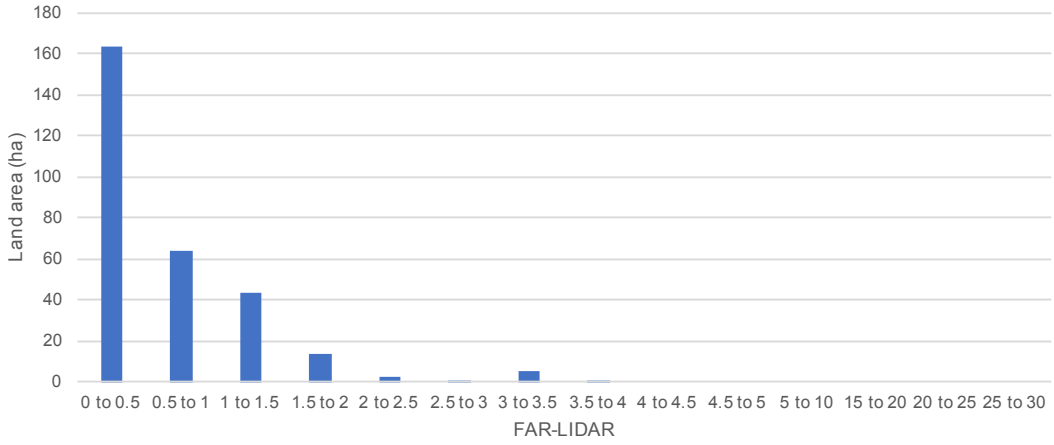
This shows a markedly different pattern: (i) fewer highly-developed sites; and (ii) no FARs above 5. Excluding many sites with very low site coverage, the median SCR is about 0.5-0.6.

FIGURE 123: DISTRIBUTION OF FAR-LIDAR AND SCR-LIDAR IN LOWER HUTT'S ZONES

Panel A: Distribution of site cover ratio



Panel B: Distribution of FAR-LIDAR



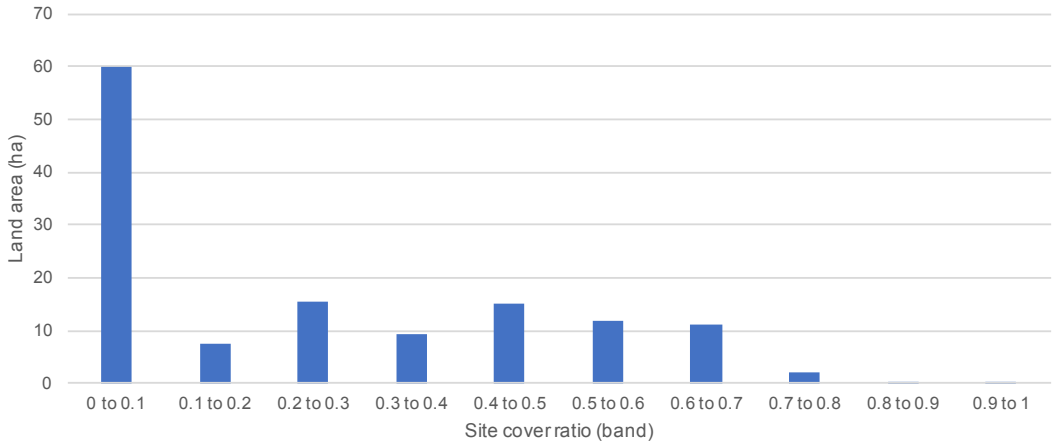
Source: Local councils, MRCagney

Figure 124 shows the distribution of SCRs in Upper Hutt's industrial and commercial zones.

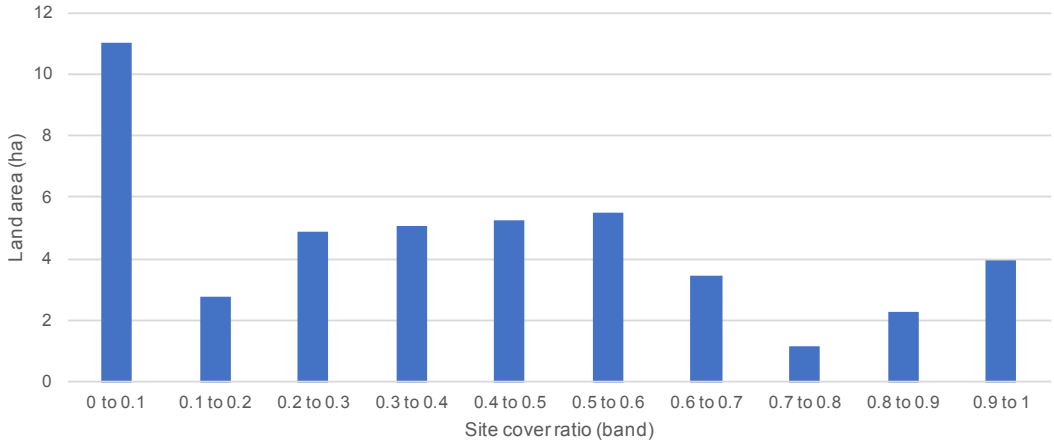
The first panel shows a very similar distribution to Lower Hutt's General Business zone, while the second panel shows greater variation in SCRs, including some sites that are nearly fully built out on the ground level.

FIGURE 124: DISTRIBUTION OF FAR-LIDAR AND SCR-LIDAR IN UPPER HUTT'S ZONES

Panel A: Distribution of site cover ratio



Panel B: Distribution of FAR-LIDAR

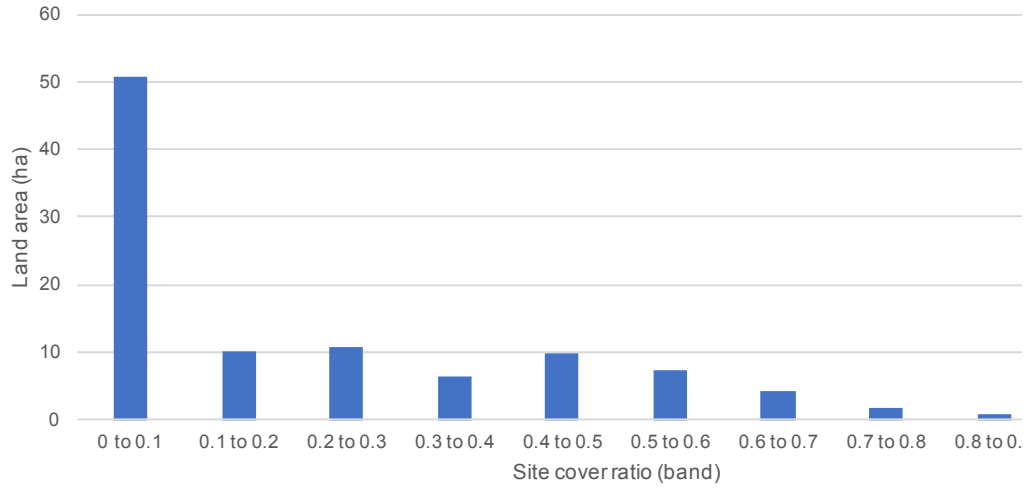


Source: Local councils, MRCagney

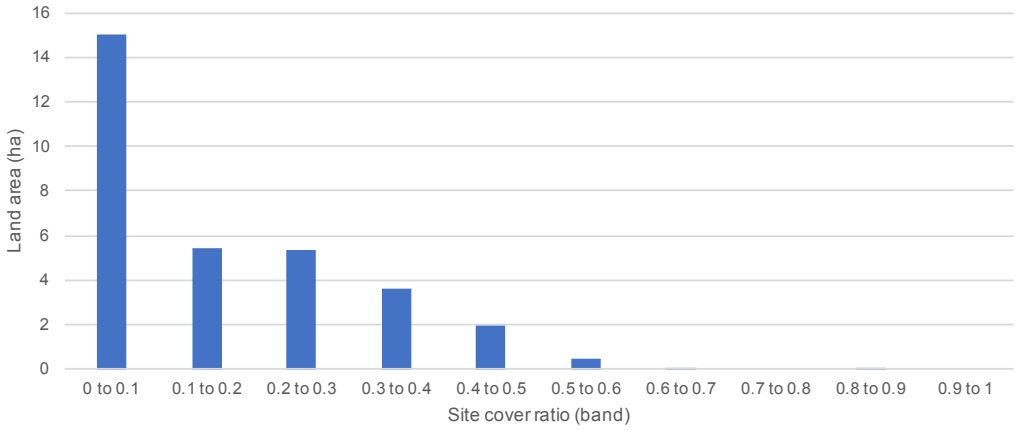
Finally, the following diagram shows the distribution of SCRs in selected industrial and commercial zones in Kapiti Coast. The first panel shows a very similar distribution to other industrial zones, while the second panel shows generally lower SCRs in the Outer Business Centre zone, reflecting its role as a 'big box' retail area.

FIGURE 125: DISTRIBUTION OF SCR-LIDAR IN SELECTED KAPITI BUSINESS ZONES

Panel A: Distribution of site cover ratio in industrial zone



Panel B: Distribution of SCR-LIDAR in Outer Business Centre zone



Source: Local councils, MRCagney

4.3.4 Floor area ratios by council and activity type

To account for variation in FARs, we suggest a set of summary-FARs for 3 broad business activities – industry, retail, and office-based businesses (including government services) – in each of the council areas. Figure 126 summarises these FARs and explains how they are derived. There are some caveats on the application of these values:

1. They reflect averages, and the distribution of outcomes on individual sites is likely to differ. Sites largely undeveloped to any significant extent are excluded.
2. Office activities in some areas are likely to build up, and as a result may take place on the same sites as retail activities or rental activities. So, in central areas, demand for office floorspace (the vertical dimension) will also matter in addition to land needs.
3. We recommend sensitivity tests (using the values Figure 126), to reflect uncertainty about the distribution of outcomes in practice or the underlying quality of data.

FIGURE 126: ESTIMATED FARS FOR BUSINESS ACTIVITIES IN WELLINGTON COUNCILS

Activity	Estimated FAR	Derivation
		Wellington City
Industry	0.4 (Sensitivity: 0.5)	Industrial activities are likely to predominantly occur on the ground floor, rather than in multi-storey buildings. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Wellington's Business 1 and 2 zones is 0.39. The SCR in the Business 1 zone is slightly higher (0.5) and could be used as a baseline.
Retail	0.75 (Sensitivity: 1.0)	Excluding sites with an SCR under 0.1, the average FAR-LIDAR in centre zones (where many retail activities are concentrated) is 0.86. Adjusting for overestimates due to use of LIDAR data, this indicates a FAR of around 0.75. City centre retail may have a larger FAR due to the propensity to use up a larger share of the ground storey.
Office-based businesses	5.0 (Sensitivity: 2.5)	Excluding sites with an SCR under 0.1, the average FAR-LIDAR in the central area is 2.88. Adjusting for overestimates, this indicates a FAR of around 2.5. However, the distribution of FARs in the city centre has a local peak in the 5-10 range. This suggests that buildings of this size are typical for office purposes. Consequently, a higher value should be used as a baseline.
		Lower Hutt City
Industry	0.4 (Sensitivity: 0.5)	Industrial activities are likely to predominantly occur on the ground floor, rather than in multi-storey buildings. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Lower Hutt's General Business zone (which enables industrial activities as well as non-industrial activities) zone is 0.50. The average SCR in the Special Business zone, which enables hazardous industrial activities at Seaview, is slightly lower at 0.44.
Retail	0.7 (Sensitivity: 0.5)	Outside central areas, retail activities are likely to predominantly occur on the ground floor, rather than in multiple storeys. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Lower Hutt's Central Commercial zone is 0.69. They are lower in the Special Commercial and Suburban Commercial zones (0.48).
Office-based businesses	1.3 (Sensitivity 2.5)	Excluding sites with an SCR under 0.1, the average FAR-LIDAR in Lower Hutt's Central Commercial zone is 1.53. This is used as a proxy for the density of office buildings outside central Wellington. Adjusting for overestimates, this indicates a FAR of around 1.3.

	Upper Hutt City	
Industry	0.4 (Sensitivity: 0.5)	Industrial activities are likely to predominantly occur on the ground floor, rather than in multi-storey buildings. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Upper Hutt's Business – Industrial zone is 0.42.
Retail	0.5 (Sensitivity: 0.7)	Outside central areas, retail activities are likely to predominantly occur on the ground floor, rather than in multiple storeys. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Upper Hutt's Business – Commercial zone is 0.52. (The sensitivity test is drawn from Lower Hutt data.)
Office-based businesses	1.0 (Sensitivity: 1.3-2.0)	Excluding sites with an SCR under 0.1, the average improvement value per square metre of land in Upper Hutt's Central Commercial zone is $2410/m2. Based on the average relationship indicated in our analysis this suggests that there is roughly 1 square metre of floorspace per square metre of land. This is used as a proxy for the density of office buildings in Upper Hutt.
	Kapiti Coast District	
Industry	0.4 (Sensitivity: 0.5)	Industrial activities are likely to predominantly occur on the ground floor, rather than in multi-storey buildings. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Kapiti Coast's Industrial zone is 0.38.
Retail	0.5 (Sensitivity: 0.35 to 0.5)	Outside central areas, retail activities are likely to predominantly occur on the ground floor, rather than in multiple storeys. Excluding sites with an SCR under 0.1, the average SCR-LIDAR in Kapiti Coast's District Centre, Local Centre, and Town Centre zones is 0.4. Ratios are slightly lower in the District Centre and Local Centre (0.35).
Office-based businesses	0.7 (Sensitivity: 1.0)	In Lower and Upper Hutt, average FARs in commercial zones are estimated to be 50% to 100% higher than average site coverage. This indicates a trend towards a mix of one and two storey buildings. If a similar relationship applies in Kapiti Coast, it would indicate FARs for office-based activities that are in the range of 0.7 to 1.0.

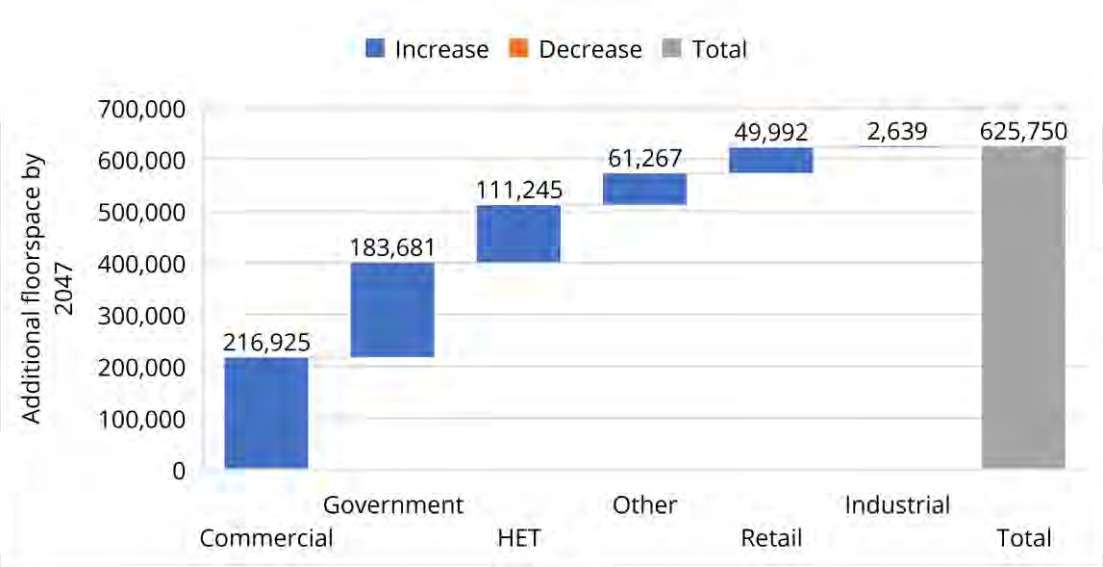
Source: MRCagney

4.3.5 Demand for business land

Floorspace

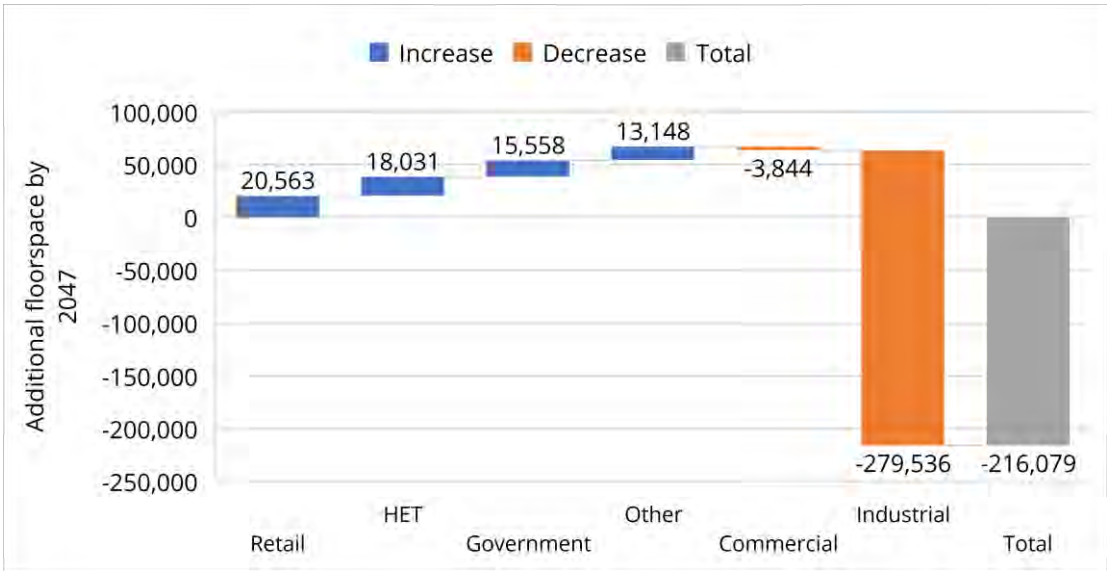
To project land demand, we use our local council activity estimates from the stage 2 report, to allocate floorspace demand to local councils, and then use our FAR estimates to construct business land demand. We summarise space demand in Figure 127 to Figure 130. A range of industries lift total floorspace demand in Wellington City by 625,750 square metres or about 11 percent. Less demand for industrial space reduces total demand for Lower Hutt.

FIGURE 127: WELLINGTON CITY REQUIRES AN ADDITIONAL 625,750 SQUARE METRES
Wellington City, Demand for floorspace, 2000-2047



Source: Sense Partners

FIGURE 128: LOWER HUTT EXPECTED TO HAVE LESS DEMAND FOR INDUSTRIAL SPACE
Lower Hutt, Demand for floorspace, 2000-2047

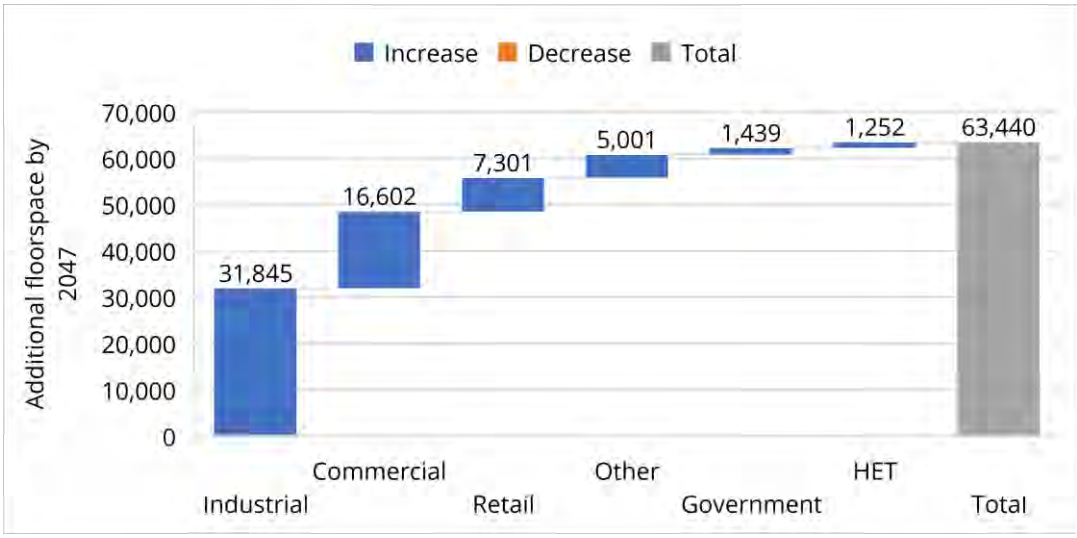


Source: Sense Partners

Although total demand for business land falls across for Lower Hutt, councils will need to be mindful of assessing opportunities to substitute industrial land to other uses. Industrial land has specific characteristics including locating specific employment opportunities in a region. Fulsome cost-benefit assessment is required before substituting industrial land to other uses.

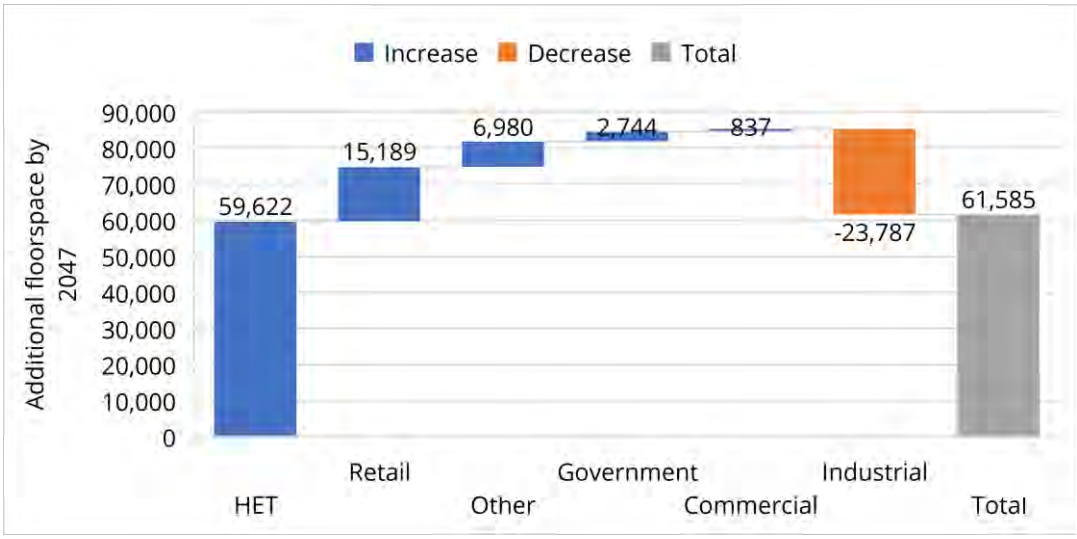
Industrial land demand holds up for Upper Hutt. We expect Upper Hutt to continue to increase its share of industrial employment in the region. Partly this reflects an expected continuation of recent trends towards firms seeking to reduce earthquake risks with some locations in Upper Hutt offering more stable land (see Box B).

FIGURE 129: OUR METHODS SHOW MODEST RISE IN UPPER HUTT FLOORSPACE
Upper Hutt, Demand for floorspace, 2000-2047



Source: Sense Partners

FIGURE 130: KAPITI COAST SHOWS STRONG DEMAND FOR HET FLOORSPACE
Kapiti Coast, Demand for floorspace, 2000-2047



Source: Sense Partners

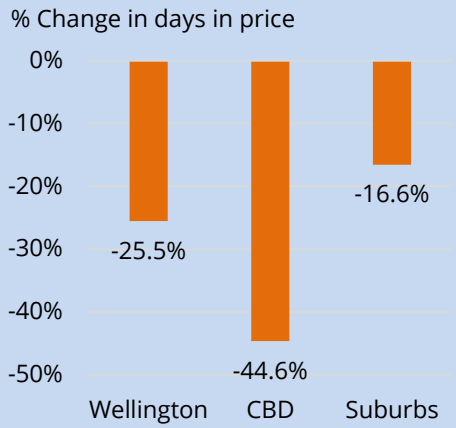
By 2047, we expect many more health and education workers are needed in the Kapiti Coast and this boosts demand for business land in the Kapiti Coast. Industrial demand falls a little.

Box B: Earthquake & sea-level rise change market dynamics

Increased attention to earthquake risk (following the Christchurch earthquakes on Sept 4 2010 and Feb 11 2011, and the Kaikoura earthquake, Nov 14, 2016) is reshaping the market for business land in the Wellington region. Our business contacts report the risk of sea-level rise affects firms' location choices, including the large plots of industrial land in the Seaview area. Anecdotally, premises with high building code standards are pre-requisites for both domestic and international investors to invest in local firms within the regime.

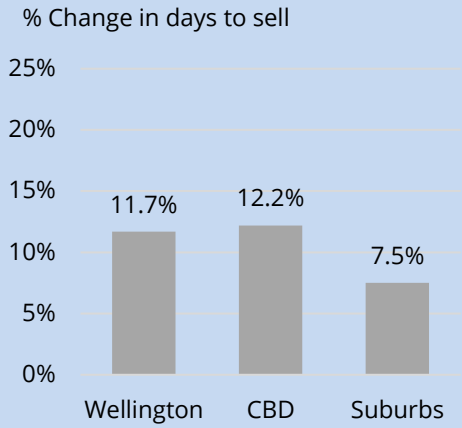
Seismic activity shifts the value of commercial property. A recent study by Motu, conducted in the year prior to the Kaikoura earthquake, finds that the price of earthquake-prone buildings in Wellington fell substantially after the Christchurch earthquakes (see Figure 131) and took longer to sell (see Figure 132).

FIGURE 131: EARTHQUAKE-PRONE BUILDINGS TAKE A PRICE-HIT



Source: Motu (2015) study

FIGURE 132: EARTHQUAKE-PRONE BUILDINGS TAKE LONGER TO SELL



Source: Motu (2015) study

These impacts change demand for land within the Wellington region in at least two ways:

1. Speeding up the building cycle as buildings become too costly to repair to code and quickly depreciate to end-of-life. This creates opportunity to build up in the CBD.
2. Increasing the relative price of sound business land to appreciate relative to land with substantial geotechnical issues.

Together, these features are changing the landscape of the city right now. Earthquake strengthening is supporting construction activity, already booming from rapid population growth.

Additional earthquakes are likely to incentivise further strengthening of the building code, so we see current seismic strengthening as part of an ongoing process that will underpin construction activity for some time. Our forecasts embed a moderation in population growth, which would moderate the current pace of activity over time.

Business Land

Our estimates suggest Wellington City needs more business land over the next thirty years. Additional land is required across all sectors, particularly retail, health and education, the commercial and government sector but also some for the industrial sector.

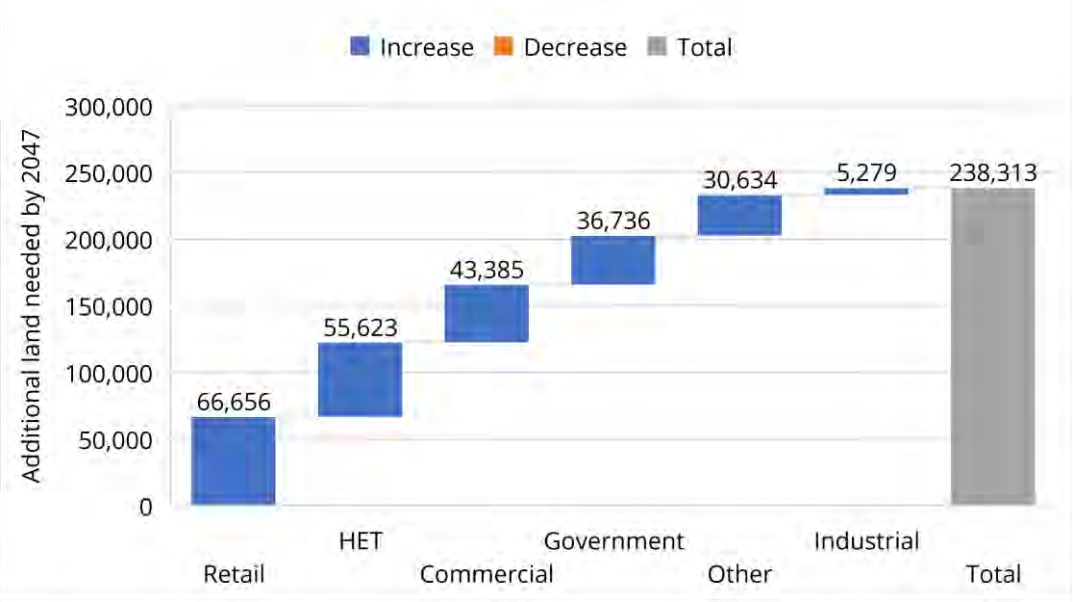
The demand sums to 238,313 square metres of business land (equivalent to perhaps 100 supermarkets) or a 4 percent increase in business land. This is much weaker than population growth of about 20 percent over that period. Many factors help hold down land demand:

(i) workforce growth is weaker than population growth

(ii) activity continues to shift away from floorspace intensive activities like industrial towards services that use land more intensively

(iii) each industry intensifies its use of space (for example, government office workers requiring less floorspace).

FIGURE 133: WELLINGTON CITY REQUIRES SUBSTANTIVE ADDITIONAL BUSINESS LAND
Wellington City, Demand for business land, 2000-2047



Source: Sense Partners

Demand of land in Lower Hutt is expected to decline over the next 30 years.

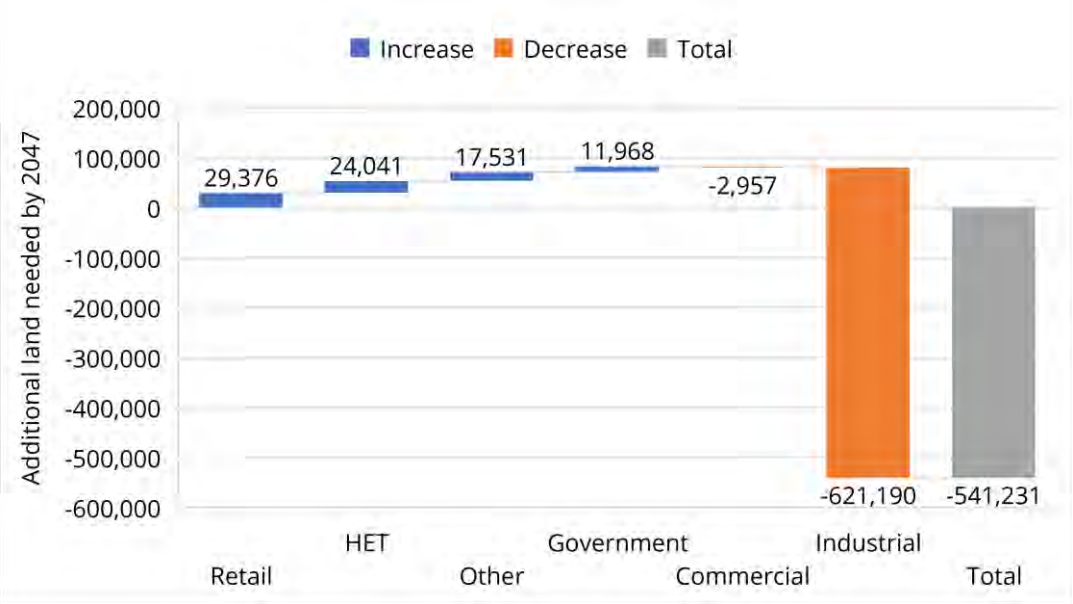
Lower Hutt has a substantial area of industrial land. We expect a mild decline in industrial activity across the region. Lower Hutt is also losing its share of industrial activity, exacerbating the overall decline. Moreover, we expect the floorspace required for industrial activity to decline a little over time as heavy industrial activities are replaced by industrial activities that are slightly less land intensive. These factors all sum to a material 40 percent decline in the demand for business land in Lower Hutt.

Several points are important in our analysis. First, our projections are conditional on the types of movements we have seen in activity over the past 20 years. Technology and policy can influence outcomes and our forecasts are no fait accompli. Moreover, our forecasts are

conditional on Statistics New Zealand's medium population projection. There is likely some upside risk to these projections (downside risks are possible but less likely) that could boost the outlook, a point we explore in section 4.

Nevertheless, any decline in the need for business land might provide councils with an opportunity to promote other uses. Councils will need to think through the costs and benefits of alternative uses for industrial land in Lower Hutt.

FIGURE 134: DEMAND FOR INDUSTRIAL LAND IN LOWER HUTT MUCH LOWER BY 2047
Lower Hutt, Demand for business land, 2000-2047



Source: Sense Partners

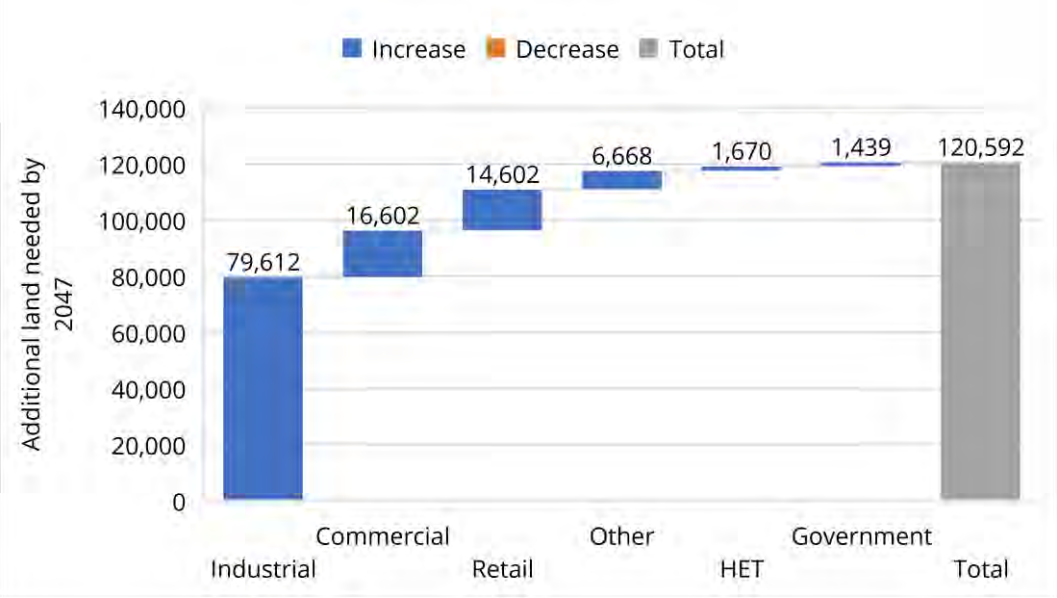
Demand for business land in Upper Hutt is expected to grow over the 30 years to 2047 (see Figure 135. Increasing market share for industrial land is sufficient to generate an increase in land requirements even though industrial requirements overall are declining across the region.

Mild increases in commercial and retail activity also boost the outlook. Government activity only provides a small lift in terms of land requirements but further safety concerns over seismic stability of land in the Wellington region could boost demand for land in Upper Hutt.

Our estimates suggest the Health, Education and Training sector is the primary driver of business land demand on the Kapiti Coast (see Figure 136). An ageing population is likely to continue to increase the strong demand for services in the region that has grown rapidly in recent years.

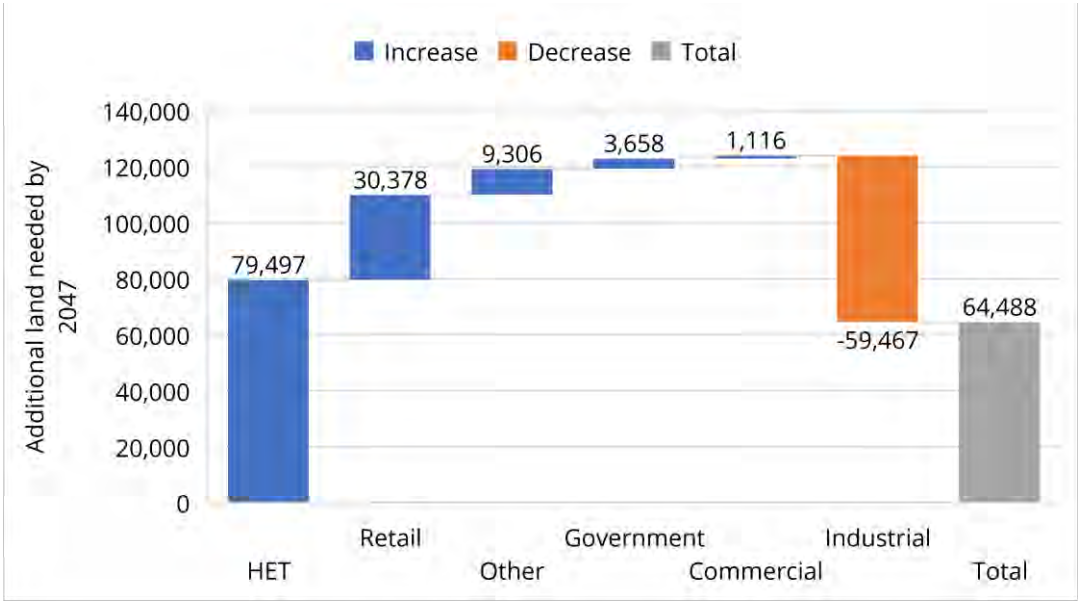
Population growth is also expected to generate some additional retail activity which impacts demand for land, although the region is relatively well serviced. Like elsewhere, a mild decline in industrial activity reduces land demand overall.

FIGURE 135: EXPECT MODEST GROWTH IN DEMAND FOR UPPER HUTT BUSINESS LAND
Upper Hutt, Business land demand, 2000-2047



Source: Sense Partners

FIGURE 136: HEALTH AND EDUCATION WORKERS DRIVE LAND DEMAND IN KAPITI
Kapiti Coast, Business land demand, 2000-2047



Source: Sense Partners

4.4 Alternative demographic assumptions

4.4.1 Demographics

Demographics can have a material impact on the structure of the economy. This occurs through several channels, including the consumer side, with additional demand for schools, community services and retail.

Demographics also impact on production. With population growth comes growth in the workforce, but an ageing population is likely to be part of the labour force attachment. The age profile of the local population can also help determine business land demand.

To test the impact of alternative demographic assumptions on the demand for business land, we take two alternative forecasts of the local population: (i) Statistics New Zealand's high forecast; and (ii) forecast.id's population forecast for the Wellington region.[10]

Over recent years, population growth has consistently outstripped Statistics New Zealand's medium population forecast. So we experiment with a stronger population projection, and do not advocate using Statistics New Zealand's low population forecast.

4.4.2 The population scenarios

Figure 137 shows the forecast.id population forecast for the Wellington region vs Statistics New Zealand's medium population projection. The forecasts have similar regional profiles. Differences relate to the weak growth Statistics New Zealand suggests for the final projection years of one percent over 5 years – when current growth is almost two percent each year.

Statistics New Zealand produce what they consider 'high' and 'low' population forecasts to complement their 'medium' projection we use for our baseline forecast.

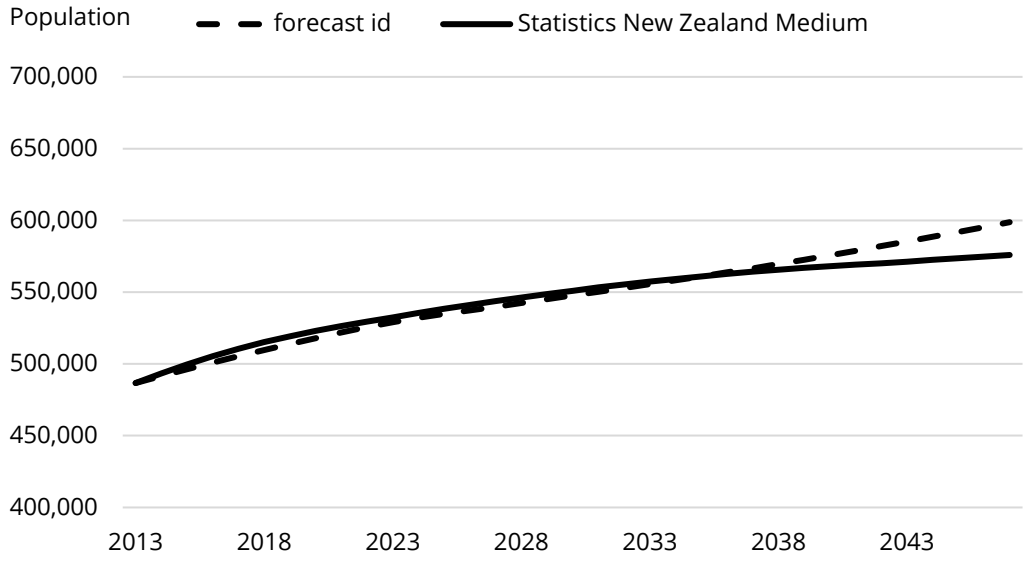
For many years, national population growth has exceeded Statistics New Zealand's population forecasts. For example, Statistics New Zealand's 2014 forecast for New Zealand's population growth in 2017 predicted growth of 0.9 percent but the population grew 2.1 percent.

The difference in outcomes is almost entirely driven by migration – a basic assumption rather than a nuanced model in Statistics New Zealand's methodology. Our own work on migration forecasting indicates migration is likely to continue to be stronger than Statistics New Zealand assumes. So, to think through the impacts on business land of stronger population growth, we conduct a scenario using Statistics New Zealand's high population forecast. By the end of the

[10] The company forecast.id provide population forecasts to some local councils in Australia and New Zealand.

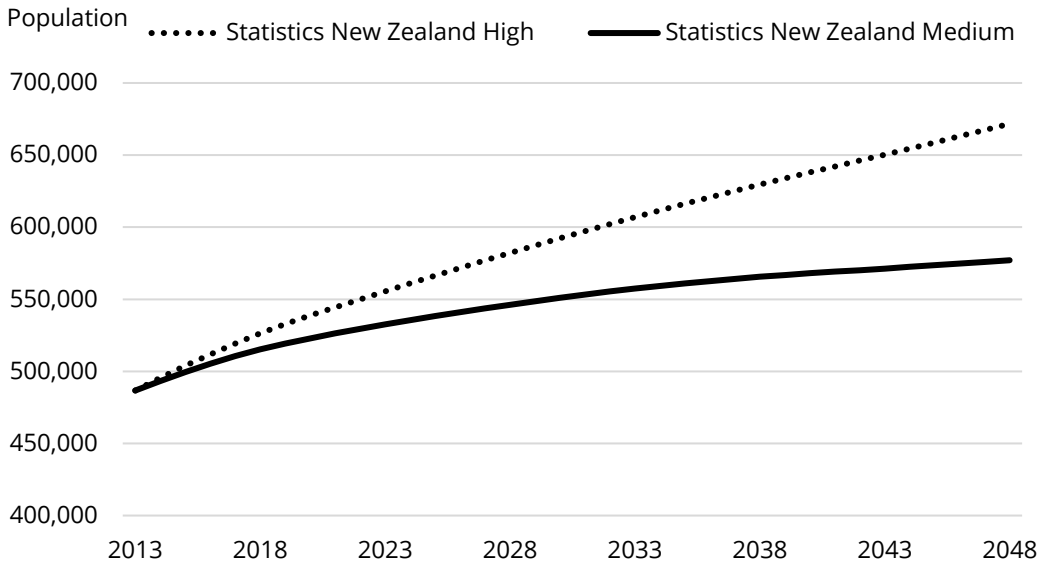
forecast period, the Statistics New Zealand high population forecasts is 14 percent higher than the medium- projection.[11]

FIGURE 137: FORECAST.ID'S FORECAST IS SIMILAR TO STATISTICS NEW ZEALAND'S
Expected Population, Wellington region



Source: Statistics New Zealand and forecast.id

FIGURE 138: WE MAKE A SCENARIO WITH STATISTICS NEW ZEALAND 'HIGH' FORECAST
Alternative Statistics New Zealand population forecasts for the Wellington region



Source: Statistics New Zealand and forecast.id

[11] Since we need a forecast to 2047, we use the growth rate at the end of each Statistics New Zealand forecast to rate the forecast forward to 2047.

4.4.3 Impacts on business land demand

Figure 139 compares the impacts of the population scenarios relative to percentage increase in land demand in our baseline case. Appendix 4 shows additional charts for each council.

FIGURE 139: SUMMARY OF POPULATION SCENARIOS: % CHANGE IN LAND DEMAND

	Kapiti			Lower Hutt			Upper Hutt			Wellington City		
	3-yr	10-yr	30-yr	3-yr	10-yr	30-yr	3-yr	10-yr	30-yr	3-yr	10-yr	30-yr
Total												
Baseline	1.47	0.82	4.78	2.28	-4.77	-12.1	8.09	8.86	10.51	5.63	3.32	3.89
forecast.id	0.97	1.31	14.24	0.15	-6.83	-7.12	4.98	5.81	15.56	5.30	2.87	3.87
High projection	4.63	7.16	21.15	5.51	1.39	2.98	11.63	16.32	31.95	8.52	8.89	17.40
Commercial												
Baseline	1.22	-1.20	5.05	-7.71	-10.6	-4.75	4.83	6.53	16.18	5.30	8.11	19.56
forecast.id	0.73	-0.72	14.53	-9.63	-12.54	0.61	1.81	3.54	21.49	4.98	7.64	19.54
High projection	4.37	5.02	21.46	-4.79	-4.83	11.56	8.26	13.83	38.72	8.19	13.94	35.11
Government												
Baseline	4.94	7.37	13.00	8.06	12.71	19.30	3.65	6.49	12.12	8.57	18.15	41.11
forecast.id	4.42	7.89	23.19	5.81	10.26	26.01	0.67	3.50	17.24	8.24	17.63	41.08
High projection	8.20	14.12	30.65	11.47	19.99	39.72	7.05	13.78	33.88	11.55	24.52	59.46
Retail												
Baseline	4.54	7.34	10.85	2.81	3.82	6.52	3.87	5.54	8.43	2.57	3.34	5.98
forecast.id	4.03	7.86	20.85	0.68	1.57	12.51	0.88	2.58	13.38	2.25	2.89	5.96
High projection	7.79	14.09	28.16	6.06	10.53	24.75	7.27	12.77	29.46	5.38	8.91	19.76
Industrial												
Baseline	-0.73	-5.02	-7.08	2.48	-7.22	-18.0	10.61	10.80	10.57	6.79	2.23	0.13
forecast.id	-1.22	-4.55	1.30	0.35	-9.24	-13.4	7.43	7.70	15.62	6.47	1.79	0.11
High projection	2.36	0.96	7.44	5.71	-1.23	-3.97	14.24	18.39	32.02	9.72	7.75	13.14
Health and Education												
Baseline	6.50	24.33	74.26	0.75	3.81	8.67	-2.67	-0.99	2.73	2.30	8.95	20.72
forecast.id	5.98	24.93	89.97	-1.34	1.56	14.79	-5.47	-3.77	7.42	1.98	8.47	20.70
High projection	9.81	32.15	101.5	3.93	10.52	27.28	0.53	5.79	22.66	5.10	14.82	36.42
Other												
Baseline	6.54	6.82	13.23	0.91	3.55	9.69	5.41	8.41	14.91	2.29	6.02	12.80
forecast.id	6.02	7.34	23.44	-1.18	1.30	15.86	2.38	5.37	20.16	1.98	5.56	12.78
High projection	9.86	13.54	30.91	4.10	10.24	28.47	8.87	15.83	37.21	5.10	11.74	27.47

Source: Sense Partners

Business land demand under the forecast.id population forecast

The table includes the outlook for Wellington City conditional on the forecast.id population forecast.[12] Outcomes are very similar to our baseline that uses the Statistics New Zealand medium-term projection to show Wellington City additional business land demand. The forecast for total business land demand is slightly lower than the baseline because forecast.id allocates a slightly lower share of population growth in the region to Wellington City compared to Statistics New Zealand. The figures in Appendix 4 provide additional details.

Since the outlook for Lower Hutt is driven by the industrial sector that has large land requirements per worker, small population movements impact total business land demand. The table also shows the large decline in the demand for land in the industrial sector that characterised the outlook for Lower Hutt when using the Statistics New Zealand medium-term projection.

Upper Hutt exhibits higher business land demand under the forecast.id population forecast than the Statistics New Zealand forecast. By the end of the period, population growth in Upper Hutt is sufficient to generate extra demand for industrial land in particular (161,000 extra square metres across 30 years) that lifts demand higher.

The forecast.id projection for the Kapiti is more optimistic than Statistics New Zealand. Forecast.id expect population growth of 20 percent (almost an additional 6,000 people) between 2018 and 2043 and this helps lift demand for business land see Appendix 4).

Business land demand under Statistics New Zealand's 'High' population assumption

Under the high population scenario, Wellington City requires substantially more business land – a little over 1,000,000 extra square metres over the thirty years to 2047, an increase of about 17 percent (and to give a sense of forecast risk, the additional demand is almost 70% more than under the median projection.) Figure 197 in Appendix 4 provides details.

Although the industrial sector is declining across the region, Wellington City has been slightly increasing the share of activity – up 6 percent over the last ten years. Industrial activity takes substantive amounts of floorspace and the specific floor-to-area ratio we use for Wellington City is 0.5, so any increase in floorspace requirements doubles land requirements. As the city grows some intensification is likely to occur in the industrial sector, reducing space requirements, but quantifying the extent to which this is occurs is a question about capacity.

More modest increases in land requirements for retail, health and education and our 'other' sector also increase demand for land. While the increases in demand for commercial and government land are relatively small, this reflects the high floor-to-area ratio we use for these sectors in Wellington City.

---

[12] Figure 193 to Source: Sense Partners

Figure 196 show additional detail on the impact of the forecast.id population projection on a council-by-council basis.

These are businesses located inside the CBD where land is at a premium. Although the land requirements are relatively small, securing additional land is likely to be very difficult but again, this is a question about capacity.

In aggregate, higher regional population growth approximately offsets the decline in industrial land demand in Lower Hutt (see table). Demand for land increases substantially across most sectors. Demand for retail land increases by almost 25 percent and health and education also increases substantially.

But industrial land is not likely to be easily turned to other uses. Accommodating marked increases in land demand in some sectors is likely to require careful planning decisions.

The table also shows the outlook for Upper Hutt under the high population growth scenario. The industrial sector requires substantial land to accommodate the new population track. Upper Hutt is increasing market share of the industrial sector and then must also accommodate additional population growth so additional demand for land is material.

This highlights some of the uncertainties that need to be considered for planning purposes. While the medium population growth scenario produces only modest land requirements, the high population scenario suggests much more is required.

This presents a risk to councils – who will need to pick a way to manage this. Whether to initially plan on high or medium population growth depends in part on the costs and benefits of each approach, including how easy it is to change later.

Population growth a has large influence on demand for business land in the Kapiti Coast. Additional workers are predominantly employed in the Health and Education sector with additional workers in retail and the industrial sector.

The retail sector has expanded substantially in Kapiti in recent years with many new retail suppliers entering the market. Right now, the region appears well-served and current providers may even accommodate some additional growth before additional land is required.

These sectors require substantive amounts of floorspace. Our assumptions for the floor-to-area ratios for each sector mean additional land is required to accommodate floorspace demands. A little over 20 percent more business land could be required.

4.5 The impact of transport linkages

4.5.1 Regional transport improvements and economic activity

Most investments in transport infrastructure lift economic activity through two distinct channels, as they effectively bring in more people to the region:

i. **Deepening local markets** including thickening local labour markets that enable more productive matches between firms and workers, increasing firms' access to intermediate suppliers that can also increase specialisation, and promoting agglomeration effects (gains from information sharing when workers locate close together).

ii. **Broadening the local markets** by increasing the number of consumers in the geographic range of the market. This can enable new investment opportunities as existing firms can scale up and specialise their product and services.

The two channels change the underlying structure of the economy, promoting some industries while other industries fade. Over enough time, households also change where they want to live, changing the spatial distribution of the economy.

Often, large and dense cities benefit more from infrastructure spend that unlocks constraints on resources, resulting in a larger and more productive economy. But equally, economies that start from a low population base can experience large effects when population growth occurs after decades of low or stagnant growth.

Investment in transport reduces travel times both to the core or larger city as well as away from the core city. Firms may choose to reap the benefit of lower transport costs and service the city from cheaper locations outside the city. Alternatively, some firms may choose to locate within the city and service the region from a central location with reduced travel costs. Over time, the relative price of land adjusts to where firms are indifferent about location.

Households respond positively to employment opportunities and amenity value (sometimes facilitated by increased density). The cost of housing and increased transport times are negative factors. The combination of positive and negative factors bound the size of cities with positive benefits pulling additional people into the city (and negative factors pushing them out) until increased transport and housing costs equate inflows with outflows.

4.5.2 Modelling the impact of improved linkages

Modelling the impact of transport infrastructure on economic activity and location choice can be difficult. Not only does the impact of infrastructure on activity need to be modelled but the spatial location of activity needs to be modelled. Moreover, models of economic activity need to account for the second-round impacts on activity from the changes in prices of inputs to production that can occur when location of people and firms changes.

Two recent NZTA research reports provide guidance on how to gauge likely impacts for New Zealand.[13] These are detailed studies that develop, build and estimate activity and spatial models to quantify impacts based on transport infrastructure projects in the Golden Triangle – the region that spans Auckland, Hamilton and Tauranga.

Rather than reinvent these studies we use their parameter estimates to gauge the likely effects of the transport improvements associated with improvements in the Northern Corridor before turning to the improvements associated with *Let's Get Wellington Moving*. Since we do not re-estimate the models, our approach should be considered as indicative of the direction and broad scale of the impacts.

These studies use a Gross Value Add model to measure impacts on economic productivity. Then a spatial general equilibrium model is used to understand the location of activity and the impact on land use.

One of the key variables within the approach is to identify improvements in access – both a deepening of local markets and a broadening of the consumer markets. Byett et al. (2015, 2017) experiment with variables that leverage access to ports and airports and the population mass of the local area. Two of their variables relate directly to deepening and broadening of local markets:

(i) Proxy of population within a 40-minute drive of the location. This measure is the 80th percentile of US commute times and might be expected to define a local labour market. We calculate this measure based on the centre of each suburb (Statistics New Zealand area units) to each location, in our case, the CBD of each local council.

(ii) Proxy of population within a 120-minute drive of the location. This measures approximately same-day delivery areas, as a proxy for the local consumer market. We calculate this measure based on the centre of each suburb to the CBD of each local council.

We compare these access variables before and after the improvements to the Northern corridor. Then we apply the elasticities from the Byett et al. (2017) model that translate accessibility improvements to productivity, applying MBIE's modelling nominal GDP estimates since these measures are available at detailed sub-industry level. Then we assume that over enough time productivity improvements translate to wage growth that attracts population growth to the region one-for-one. Finally, we use these population scenarios to update our business land projection.

Richer approaches might test the robustness of our estimates to alternative access variables. Additional sensitivity tests might be usefully conducted on a range of travel time improvements. But this would require a specific transport study – beyond the scope of this current project. Our goals are simpler – identify the likely scale of impacts and the regions that are likely to experience the largest changes.

[13] See Byett et al. (2015, 2017)

4.5.3 Transport improvements to the Northern corridor

From an economic activity perspective, Wellington's major transport infrastructure are associated with improvements to the Northern corridor. These projects split into two types: (i) infrastructure improvements that improve flows into and out of the city; (ii) improvements that improve flows around the city. The first suite of improvements that help improve flows into and out of the city include:

- **The Smart Motorway** – applied to the flows between Johnsonville and Wellington, the region's busiest flows.
- **Transmission Gully** – the largest infrastructure project in the region (the 27 kilometre motorway from Mackays Crossing to Linden, with associated link roads and interchanges) impacts the councils in this study, as well Porirua and Horowhenua.
- **Mackays to Peka Peka** – the completed 18 kilometre four-way expressway that separates local and highway traffic along the Kapiti Coast, with impacts on activity already materialising.
- **The Peka Peka to Otaki Expressway** – the Ōtaki bypass increases flows between Wellington and the logistics and other industries in central New Zealand, including Horowhenua and Palmerston North.
- **Otaki to North of Levin** – the northernmost section of the corridor that links the northern part of the Kapiti Coast to Horowhenua and central New Zealand.

NZTA also highlight a second suite of three projects located in Wellington city:

- **The Mt. Victoria tunnel duplication**
- **Tunnel to tunnel inner-city transport improvements**
- **Terrace tunnel duplication**

The overall project is forecast to deliver travel time savings of between 23 and 33 minutes between Levin and the airport in the peak period and between 17 and 20 minutes during the day in 2026. We allocate improvements across the transport projects based on a 22-minute improvement in the travel time between Wellington CBD and Levin.

Figure 140 and Figure 141 documents the travel-times pre- and post-implementation.[14] Figure 142 shows the change in market deepening and broadening.

[14] We preserve the second-suite of projects to the Let's Get Wellington moving analysis. Our 22-minutes is an average of the peak period and during the day estimates. Horowhenua and Palmerston North are included for comparison only.

FIGURE 140: APPROXIMATE TRAVEL TIMES PRE-CORRIDOR IMPROVEMENTS

Current	Horowhenua	Kapiti Coast	Upper Hutt	Lower Hutt	Wellington City	Palmerston North
Horowhenua	0	36 mins	78 mins	73 mins	77 mins	43 mins
Kapiti Coast	36 mins	0	45 mins	47 mins	45 mins	75 mins
Upper Hutt	78 mins	45 mins	0	19 mins	31 mins	117 mins
Lower Hutt	73 mins	47 mins	19 mins	0	19 mins	116 mins
Wellington City	77 mins	45 mins	31 mins	19 mins	0	120 mins
Palmerston North	43 mins	75 mins	117 mins	116 mins	120 mins	0

Source: Various

Several points are worth noting with regard to Figure 141 that shows improved times in bold and changes bracketed below:

- the northern corridor affects almost all nodes except for links between Lower Hutt, Upper Hutt and Wellington city and the link between Palmerston North
- the assumed transport time improvement between the Kapiti Coast and Wellington CBD is substantive. Expect smaller economic impacts for lower travel time savings
- travel time savings to and from the largest population centres – Wellington in particular – drive impacts.[15]

FIGURE 141: APPROXIMATE TRAVEL TIMES POST-CORRIDOR IMPROVEMENTS

Current	Horowhenua	Kapiti Coast	Upper Hutt	Lower Hutt	Wellington City	Palmerston North
Horowhenua	0	**29 mins (7 mins)**	**68 mins (7 mins)**	**63 mins (10 mins)**	**55 mins (22 mins)**	43 mins
Kapiti Coast	**29 mins (7 mins)**	0	**35 mins (10 mins)**	**37 mins (10 mins)**	**30 mins (15 mins)**	**68 mins (7 mins)**
Upper Hutt	**68 mins (10 mins)**	**35 mins (10 mins)**	0	19 mins	31 mins	**100 mins (17 mins)**
Lower Hutt	**63 mins (10 mins)**	**37 mins (10 mins)**	19 mins	0	19 mins	**99 mins (17 mins)**
Wellington City	**55 mins (22 mins)**	**30 mins (15 mins)**	31 mins	19 mins	0	**98 mins (22 mins)**
Palmerston North	43 mins	**65 mins (10 mins)**	**92 mins (25 mins)**	**91 mins (25 mins)**	**98 mins (22 mins)**	0

Source: Sense Partners

[15] Porirua's population base is included in the calculation of the access variables.

We then translate travel time savings to access variables, computing populations within 40- and 120-minutes of each local council before and after the improvements (see Figure 142).

FIGURE 142: DEEPENING AND BROADENING OF MARKETS AFTER TRANSPORT IMPROVEMENTS

Current	Wellington city	Kapiti Coast	Upper Hutt	Lower Hutt	Horowhenua	Palmerston North
Pre 40-min pop.	418,030	326,020	390,210	418,030	157,860	136,950
Post 40 min pop.	458,160	496,150	413,730	454,800	159,680	136,950
Deepening (%)	**9.6%**	**52.2%**	**6.0%**	**8.8%**	**1.2%**	**0%**
Pre 120-min pop.	543,830	734,450	665,420	547,190	756,480	604,490
Post 120-min pop.	592,420	736,080	679,630	595,780	756,480	661340
Broadening (%)	**8.9%**	**0.2%**	**8.9%**	**8.8%**	**0%**	**9.4%**

NB. Pre 40-minute population documents the population in suburbs within a 40-minute drive of the Wellington CBD before transport improvements while the post-40 minute population shows the population within a 40 minute drive after the transport improvement. Similarly, for the 120-minute pre- and post- populations.

Source: Sense Partners

With the access variables in hand, we then multiply the deepening and broadening of each market by the impact parameters in Byett et al. (2017) on an industry basis to obtain the impact on productivity. We work with nominal GDP to exploit the detailed subindustry parameters reported in Figure 143.

FIGURE 143: DEEPENING AND BROADENING AFTER TRANSPORT IMPROVEMENTS BY INDUSTRY

Industry	Access coefficient		Change in Nominal GDP			
	40-min	120-min	Kapiti	Hutt	Upper Hutt	WCC
Accommodation and Food Services	0.056	0.056	435.1	761.8	360.7	1,882.9
Administrative and Support Services	0.051	0.087	150.8	746.0	141.9	2,134.9
Agriculture, Forestry & Fishing Support Services and Hunting	-0.087	0.032	16.1	6.5	31.5	4.9
Arts and Recreation Services	0.089	0.053	348.7	805.1	673.5	2,769.7
Auxiliary Finance and Insurance Services	0.07	0.087	60.7	420.2	51.0	2,256.3
Basic Chemical and Chemical Product Manufacturing	0.061	0.068	104.1	110.0	302.3	64.2
Beverage and Tobacco Product Manufacturing	0.032	0.032	329.4	1,417.2	164.1	166.9
Building Construction	0.056	0.056	230.1	592.0	406.4	812.8
Central Government Admin, Defence & Public Safety	0.081	0.081	182.7	1,294.6	4,184.6	15,189.1
Construction Services	0.056	0.056	1,060.4	2,285.5	763.7	1,303.2
Dairy Cattle Farming	-0.078	0.032	59.4	0.0	8.9	4.5
Dairy Product Manufacturing	0.032	0.032	77.7	443.8	14.5	526.4
Education and Training	0.076	0.026	893.6	1,988.9	1,006.5	4,106.9
Electricity and Gas Supply	0.035	0.035	215.4	547.2	0.0	5,073.9
Fabricated Metal Product Manufacturing	0.061	0.063	108.9	489.0	207.8	116.7
Finance	0.065	0.087	293.4	999.5	203.3	8,819.1
Fishing and Aquaculture	0.032	0.032	6.2	5.0	0.0	31.5
Forestry and Logging	0.032	0.032	32.2	6.5	84.2	0.0
Fruit, Oil, Cereal and Other Food Product Manufacturing	0.032	0.048	190.4	447.6	119.0	398.5
Furniture and Other Manufacturing	0.061	0.061	32.2	163.2	45.4	99.4

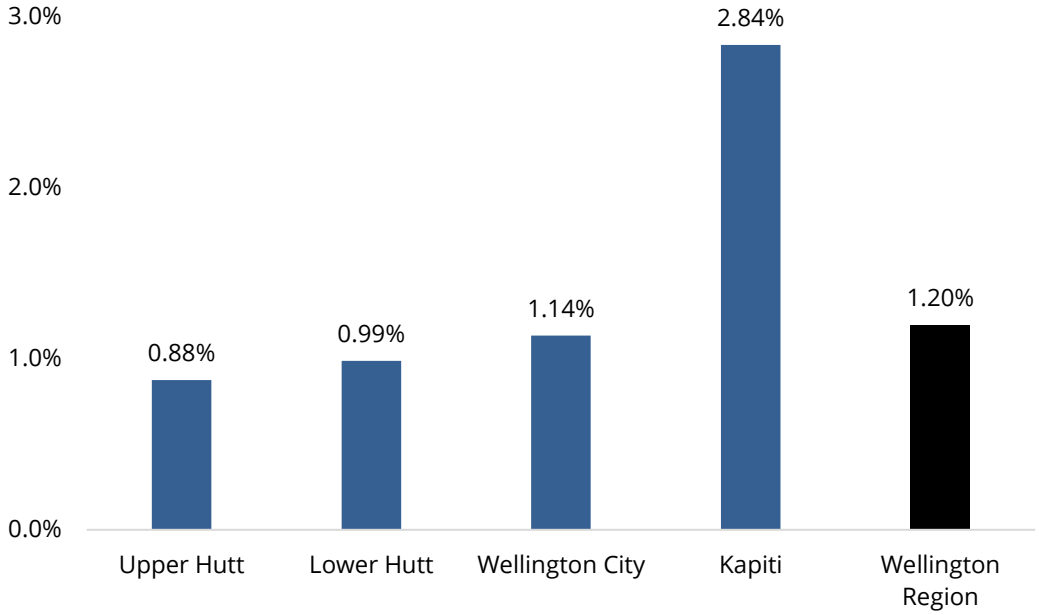
Industry	Access coefficient		Change in Nominal GDP			
	40-min	120-min	Kapiti	Hutt	Upper Hutt	WCC
Health Care and Social Assistance	0.083	0.043	1,178.5	3,758.7	826.5	5,380.2
Heavy and Civil Engineering Construction	0.056	0.056	224.9	1,015.9	246.4	334.2
Horticulture and Fruit Growing	-0.07	0.032	125.2	4.7	0.0	5.5
Information Media Services	0.077	0.068	87.8	218.5	22.1	1,390.4
Insurance and Superannuation Funds	0.077	0.087	0.0	70.8	0.0	2,935.9
Local Government Administration	0.056	0.087	205.0	211.0	137.3	394.0
Machinery and Other Equipment Manufacturing	0.061	0.067	65.9	485.3	514.1	139.6
Meat and Meat Product Manufacturing	-0.061	0.032	0.0	0.0	0.0	576.8
Mining	0.035	0.032	7.4	13.9	0.0	175.2
Motor Vehicle and Motor Vehicle Parts and Fuel Retailing	0.028	0.021	123.1	374.2	137.2	316.2
Non-Metallic Mineral Product Manufacturing	0.061	0.068	144.2	79.9	15.9	129.7
Other Services	0.096	0.069	346.9	1,010.3	329.5	2,000.2
Other Store-Based Retailing and Non Store Retailing	0.029	0.019	648.8	1,248.7	539.4	1,405.1
Owner-Occupied Property Operation (National Accounts)	0.079	0.079	793.2	2,519.2	1,147.5	6,447.4
Petroleum and Coal Product Manufacturing	0.061	0.061	0.0	180.1	0.0	4,147.5
Polymer Product and Rubber Product Manufacturing	0.061	0.061	16.2	669.8	197.7	54.7
Postal, Courier Transport Support, & Warehousing	0.057	-0.033	208.5	1,232.4	170.8	1,854.4
Poultry, Deer and Other Livestock Farming	0.032	0.032	22.8	14.4	0.0	1.3

Industry	Access coefficient		Change in Nominal GDP			
	40-min	120-min	Kapiti	Hutt	Upper Hutt	WCC
Primary Metal and Metal Product Manufacturing	0.061	0.061	11.3	156.7	25.4	26.8
Printing	0.061	0.058	52.5	402.9	13.3	253.8
Professional, Scientific and Technical Services	0.061	0.087	797.3	3,571.1	507.3	15,702.9
Property Operators and Real Estate Services	0.079	0.079	1,250.4	2,681.6	850.5	4,686.9
Pulp, Paper and Converted Paper Product Manufacturing	0.061	0.061	0.0	193.6	0.0	0.0
Rail, Water, Air and Other Transport	-0.038	0.057	129.1	20.1	151.3	2,674.0
Rental and Hiring Services (except Real Estate)	0.079	0.079	79.1	325.4	73.1	538.5
Road Transport	-0.044	0.057	258.2	1,122.1	321.4	704.8
Seafood Processing	0.032	0.032	0.0	0.0	0.0	14.3
Sheep, Beef Cattle and Grain Farming	-0.085	0.032	26.3	3.2	0.0	6.0
Supermarket, Grocery Stores and Specialised Food Retailing	0.031	0.018	404.1	547.2	380.1	771.0
Telecommunications, Internet and Library Services	0.107	0.068	156.4	433.0	168.1	4,972.5
Textile, Leather, Clothing and Footwear Manufacturing	0.061	0.061	14.0	179.3	8.6	14.7
Transport Equipment Manufacturing	0.061	0.068	8.6	198.5	9.0	46.8
Water, Sewerage, Drainage etc	0.085	0.035	160.1	1,192.7	308.3	192.7
Wholesale Trade	0.087	0.086	249.6	3,331.1	865.1	2,938.4
Wood Product Manufacturing	0.052	0.032	54.2	116.6	119.0	18.3

Source: Sense Partners

Summing up the impact across each sub-industry yields the increase in activity in each of the local councils that we display in Figure 144.

FIGURE 144: TRANSPORT IMPROVEMENTS SUGGEST MILD ACTIVTY INCREASES



Source: Sense Partners

Kapiti reaps the largest return from the improved transport links. The reduction in travel times from 45 minutes to 30 minutes pulls people and firms into the district deepening the labour market and improving local productivity. This might manifest in local offices developing rather than situating within Wellington City. The region also benefits from a broadening of the consumer market to the North of Wellington, connecting more consumers to Kapiti firms. Wellington City also benefits from the improved infrastructure links. But since the local labour market is already deep, the impacts of improved links are more muted than for Kapiti.

Our analysis suggests that Lower Hutt and Upper Hutt both benefit from the transport improvements, but the impacts are modest since the improvements are largely improvements to traffic flow along the Wellington-Kapiti-Levin route. In aggregate, our analysis suggests productivity in the Wellington region lifts by 1.2 percent.

Some points are worth closer attention. First, to model the impact on business land, we assume that increases in productivity will increase real wages and population in the long-run one-for-one. While the improvement in productivity for Kapiti is substantial and important for growth, the region's population is projected to rise by 12 percent over our thirty-year time horizon. So the impact of the transport improvements on the region are uneven, but as a whole are an order of magnitude smaller than the increasing population.

Second, our travel time estimates are based on official sources. With a staged project, travel times might be expected to change as firms respond to the types of incentives we document. Future work could detail the sensitivity of estimates to travel time assumptions.

4.5.4 Impact on business land demand

Figure 145 shows the impact of the improvements in transport infrastructure on business land demand for each of the local councils.

FIGURE 145: COMPARISON OF LAND DEMAND UNDER TRANSPORT IMPROVEMENTS

	Kapiti			Lower Hutt			Upper Hutt			Wellington City		
	3-yr	10-yr	30-yr	3-yr	10-yr	30-yr	3-yr	10-yr	30-yr	3-yr	10-yr	30-yr
Total												
Baseline	1.47	0.82	4.78	2.28	-4.77	-12.1	8.09	8.86	10.51	5.63	3.32	3.89
Transport	1.74	1.73	7.63	2.37	-4.46	-11.2	8.18	9.16	11.45	5.74	3.70	5.03
Commercial												
Baseline	1.22	-1.20	5.05	-7.71	-10.6	-4.75	4.83	6.53	16.18	5.30	8.11	19.56
Transport	1.50	-0.31	7.90	-7.62	-10.3	-3.84	3.74	6.79	13.07	5.42	8.51	20.88
Government												
Baseline	4.94	7.37	13.00	8.06	12.71	19.30	3.65	6.49	12.12	8.57	18.15	41.11
Transport	5.22	8.34	16.06	8.16	13.07	20.44	3.74	6.79	13.07	8.69	18.58	42.66
Retail												
Baseline	4.54	7.34	10.85	2.81	3.82	6.52	3.87	5.54	8.43	2.57	3.34	5.98
Transport	4.82	8.31	13.86	2.91	4.15	7.53	3.95	5.83	9.35	2.68	3.72	7.15
Industrial												
Baseline	-0.73	-5.02	-7.08	2.48	-7.22	-18.0	10.61	10.80	10.57	6.79	2.23	0.13
Transport	-0.46	-4.16	-4.56	2.57	-6.93	-17.2	10.70	11.12	11.50	6.91	2.61	1.22
Health and Education												
Baseline	6.50	24.33	74.26	0.75	3.81	8.67	-2.67	-0.99	2.73	2.30	8.95	20.72
Transport	6.79	25.45	78.98	0.84	4.14	9.71	-2.58	-0.71	3.60	2.41	9.34	22.05
Other												
Baseline	6.54	6.82	13.23	0.91	3.55	9.69	5.41	8.41	14.91	2.29	6.02	12.80
Transport	6.83	7.79	16.30	1.01	3.88	10.73	5.50	8.71	15.89	2.41	6.41	14.04

Source: Sense Partners

Demand for business land in Kapiti increases off the back of the transport infrastructure improvements and is up 7.64 percent by the end of 2047. Health, education and training demand increases by about 6.8 percent. The extra people brought in to the region partly offsets the decline in demand for industrial land.

After the transport improvements, demand for business land in Lower Hutt improves but the decline in demand for industrial land remains substantial, as in the baseline case. Total demand is up after 3 years but ultimately falls 11 percent by 2047 from the combination of a weaker outlook for industrial land and our assumption that the average industrial worker requires a smaller footprint in the future. Relative to others, Lower Hutt misses the lift in access the improvements in transport infrastructure provides.

Demand for business land in Upper Hutt is little changed by the transport infrastructure improvements. The improvement in access for Upper Hutt is even smaller than Lower Hutt –so the impacts on business land demand that we show in the table are small and up only a little on our baseline projection.

Finally, the table shows the impact of the improvements in travel infrastructure on business land demand for Wellington City. Demand is up a little across each of the industrial categories. Business demand for Wellington City now hits a little over 300,000 square metres by 2047.

5. Concluding remarks

The Wellington region will need to continue to plan how to accommodate extra demand for business land over the next 3-, 10- and 30-years. While population is expected to grow materially higher over the timeframes that matter for planning perspective, there are many factors at play that suggest demand for business land will be more modest relative to population growth.

Economic activity continues to shift away from industrial manufacturing that has traditionally required large amounts of land relative to complex commercial services that require smaller amounts of floorspace and business land. This shift has been occurring for decades but will continue to shape the economic landscape.

Changes in activity types are also happening within sector classifications. These changes are likely to further reduce the need for business land a little. For example, food manufacturing and logistics are replacing heavier industrial activity mitigating future needs for floorspace and land.

But councils need to be wary. Business needs can be localised and not easily shifted across the region. Our forecasts show strong demand for some types of business land in specific locations. This can include preferences for reducing risks associated with land subject to earthquake risk and sea-level rise. Shifts in preferences will challenge councils to meet challenges while making the most of opportunities.

Transport infrastructure also shapes the quantity and location of business land required. We show a sequence of transport infrastructure projects that improve access and travel times along the region's Northern corridor, increase but also shift where business land is likely to be needed.

There are many uncertainties, but the key uncertainty for the outlook for business land is how many people choose to live and work within the Wellington region. Our baseline forecast for business land uses Statistics New Zealand's medium population projection but there are sound reasons to consider planning to manage stronger population flows. To this end we show that demand for business land is substantially larger under Statistics New Zealand's high population projection.

Accommodating extra people has greater impacts on demand for business land than the transport infrastructure projects we consider. Councils will need to think through the costs and benefits of planning to accommodate higher population inflows. Assessing the capacity of the region to accommodate demand will help in this regard.

References

Anderson, Paul A. (1979), "Help for the regional economic forecaster: vector autoregression," *Quarterly Review*, Federal Reserve Bank of Minneapolis, vol 3(3)

Bank of New Zealand (2018), New Zealand Online Retail Sales, November and provisional December 2017 spending

Byett, A, A Stroombergen, J Laird and R Paling (2017) The economic impacts of connectivity. NZ Transport, Agency research report 608. 158pp.

Byett, A, J Laird, A Stroombergen and S Trodd (2015) Assessing new approaches to estimating the, economic impact of transport interventions using the gross value added approach. NZ Transport, Agency research report 566. 131pp.

Canova, Fabio (2007), "Methods for Applied Macroeconomic Research", Princeton University Press.

Grimes, A, E Apatov, L Lutchman and A Robinson (2014) Infrastructure's long-lived impact on urban development: theory and empirics. Motu working paper 14–11.

Grimes, A & C Young, (2013) "Spatial effects of urban rail upgrades", Journal of Transport Geography 30(6): 1-6.

Grimes, Arthur and Yun Liang, (2010) "Bridge to Somewhere: Valuing Auckland's Northern Motorway Extensions", Journal of Transport Economics & Policy 44(3): 287-315

Hamilton, J. D. (1994) "Time series analysis", Princeton, N.J.: Princeton University Press.

Hausmann, R. and B. Klinger (2006) 'Structural Transformation and Patterns of Comparative Advantage in the Product Space', CID Working Paper

Hidalgo, C. and R. Hausmann (2009) 'The building blocks of economic complexity', PNAS 2009 106 (26) 10570-10575.

JLL (2017), US Retail Investment Outlook, Quarter 4 2017.

Maré, DC and DJ Graham (2009) Agglomeration elasticities in New Zealand. Motu working paper 09–06. 128pp.

Property Economics (2017), Porirua City Industrial and Business land demand supply analysis (draft), September 2017. 1

Sims, Christopher, (1980), "Macroeconomics and Reality", *Econometrica*, 48, issue 1, p. 1-48.

Statistics New Zealand (2016). How accurate are population estimates and projections? An evaluation of Statistics New Zealand population estimates and projections, 1996–2013. Retrieved from www.stats.govt.nz.

Timar, Levente, Arthur Grimes and Richard Fabling (2015), "Before a Fall: Impacts of Earthquake Regulation and Building Codes on the Commercial Building Market" Motu Working Paper 15-19 Motu Economic and Public Policy Research October 2015

Statistics New Zealand (2016). How accurate are population estimates and projections? An evaluation of Statistics New Zealand population estimates and projections, 1996–2013. Retrieved from www.stats.govt.nz.

Urban Economics (2016), "Economics significance of the Property Industry to the Wellington Economy", Report prepared for Property Council New Zealand

Wellington City Council (2006), Long-term plan, 2006-2016, Wellington City Council, available at: https://wellington.govt.nz/your-council/plans-policies-and-bylaws/plans-and-reports/long-term-plan/long-term-plan-2006-16

Wellington City Council (2009), Long-term council community plan, 2009-2019, Wellington City Council, available at: https://wellington.govt.nz/your-council/plans-policies-and-bylaws/plans-and-reports/long-term-plan/long-term-council-community-plan-2009-19

Wellington City Council (2012), Long-term plan, 2012-2022, Wellington City Council, available at: https://wellington.govt.nz/your-council/plans-policies-and-bylaws/plans-and-reports/long-term-plan/long-term-plan-2012-22

Wellington City Council (2015), Long-term plan, 2015-2025, Wellington City Council, available at: https://wellington.govt.nz/your-council/plans-policies-and-bylaws/plans-and-reports/long-term-plan/long-term-plan-2015-25

Appendix 1: Ubiquity, diversity and complexity

Economic complexity indices measure the capability of an economy or regional economy. Economic complexity indices bring together information on the scope, or diversity of economic production and the degree to which the economy produces goods and services that are made nowhere else.

Measuring both diversity of production and the extent to which that production is unique first requires a measure of whether production is specialised. To do this, for each region we count the number of sub-industries where employment forms a higher fraction of the employment base than the national average Essentially, we count up industries that are overweight at the local level, or more formally:

$$S_{r,i} = \frac{\frac{e_{r,i}}{\sum_i e_{r,i}}}{\frac{\sum_r e_{r,i}}{\sum_{r,i} e_{r,i}}}$$

where $S_{r,i}$represents the degree of specialisation and is bounded between 0 and 1.[16]

Then, the scope or diversity of a region is the sum of all the industries where the region shows specialisation, that is:

$$d_r = \sum_i s_{r,i}$$

where d_r is the diversity index for the region. The scope or uniqueness of an industry is then:

$$u_i = \sum_r s_{r,i}$$

But then we need to move beyond the relative position of a region versus all regions (and an industry versus all industries) to compare similar and dissimilar regions. To quantify this joint analysis we iterate over the joint distribution of diversity and ubiquity, evaluating the average diversity and ubiquity score for each region for every iteration. Ultimately, successive iterations mix differences between ubiquity and diversity and leave the complexity index. More technically, the complexity index, E_r, is given by:

$$E_r = 1 + \frac{\left(d_{r,k=20} - \frac{\sum_r d_{r,k=20}}{R}\right)}{\sqrt{\frac{\sum_r \left(d_{r,k=20} - \frac{\sum_r d_{r,k=20}}{R}\right)^2}{R}}}$$

[16] For example, Wellington exhibits specialisation in book publishing (J541300), data processing and web-hosting services (J592100), management advice and related consulting services (M696200), aged care residential services (Q860100) and corporate head office management services (M696100), among other activities.

where

$$d_{r,k} - \left(u_{k-1,i}.SP'_r\right).\frac{1}{d_{r,k=0}}$$

is the diversity process at the k-th iteration and:

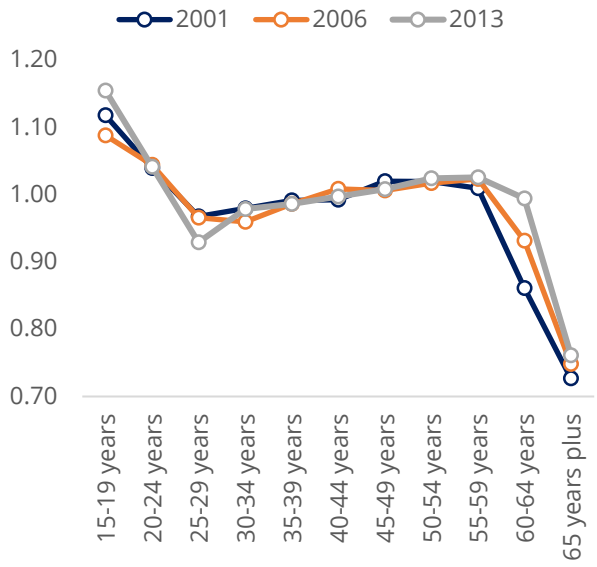
$$u_{k,i} = \left(SP'_i.d_{r,k-1}\right).\frac{1}{u_{k=0,i}}$$

gives the ubiquity measure at the k-th iteration.

We use counts of employees across 490 industries and across 16 regions to construct our time series estimates of complexity from 2000 top 2017, first converting our employee count data in specialisation measures before constructing the diversity and ubiquity measures specified above.

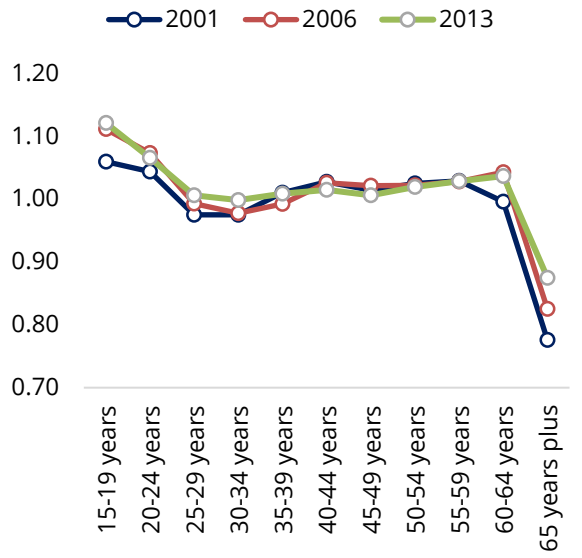
Appendix 2: Local labour markets

FIGURE 146: LABOUR FORCE PARTICIPATION: BY AGE, KAPITI COAST RELATIVE TO NEW ZEALAND
Kapiti Coast relative to New Zealand



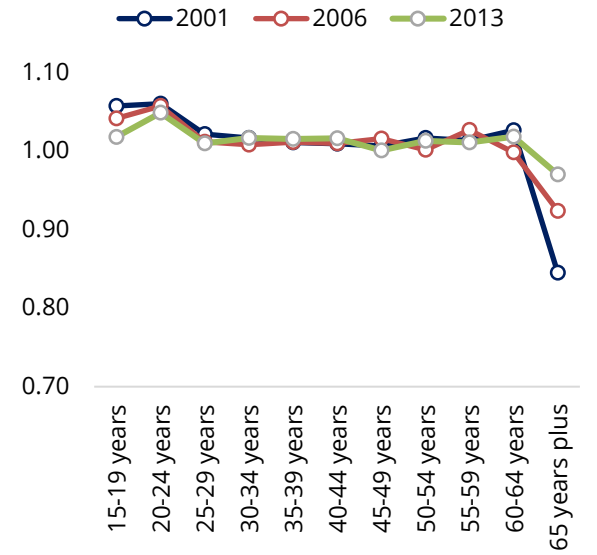
Source: Statistics New Zealand

FIGURE 147: LABOUR FORCE PARTICIPATION:BY AGE, UPPER HUTT RELATIVE TO NEW ZEALAND
Upper Hutt relative to New Zealand



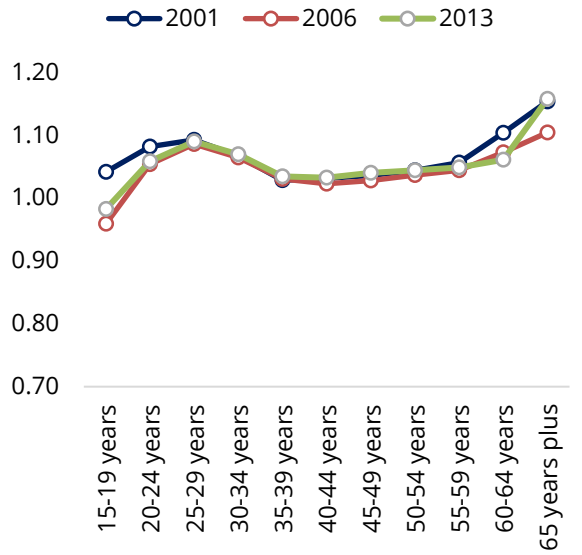
Source: Statistics New Zealand

FIGURE 148: LABOUR FORCE PARTICIPATION: BY AGE LOWER HUTT RELATIVE TO NEW ZEALAND
Lower Hutt relative to New Zealand



Source: Statistics New Zealand

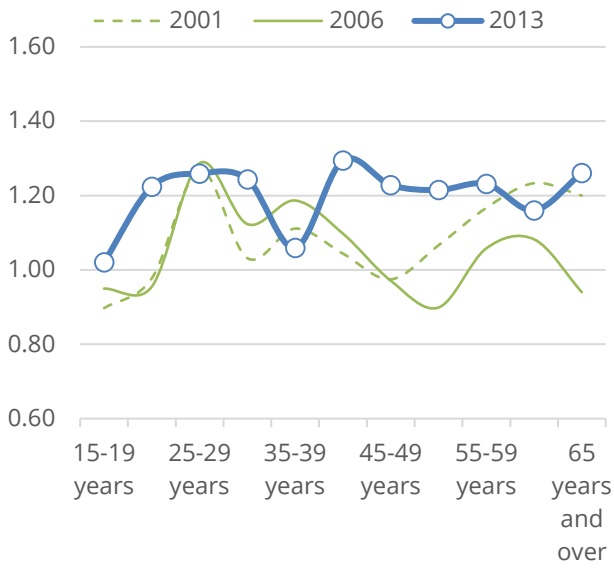
FIGURE 149: LABOUR FORCE PARTICIPATION BY AGE WELLINGTON RELATIVE TO NEW ZEALAND
Wellington City relative to New Zealand



Source: Statistics New Zealand

FIGURE 150: UNEMPLOYMENT BY AGE: KAPITI COAST

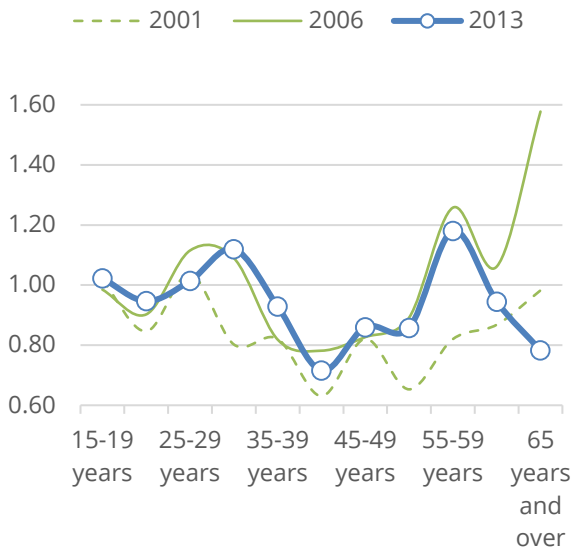
Kapiti Coast relative to New Zealand



Source: Statistics New Zealand

FIGURE 151: UNEMPLOYMENT BY AGE: UPPER HUTT

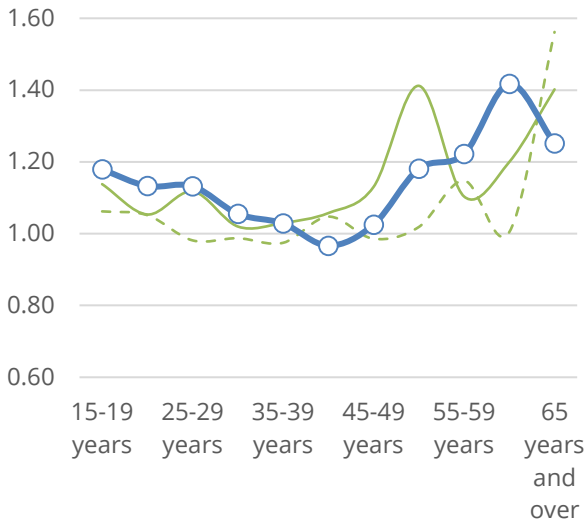
Upper Hutt relative to New Zealand



Source: Statistics New Zealand

FIGURE 152: UNEMPLOYMENT BY AGE: LOWER HUTT

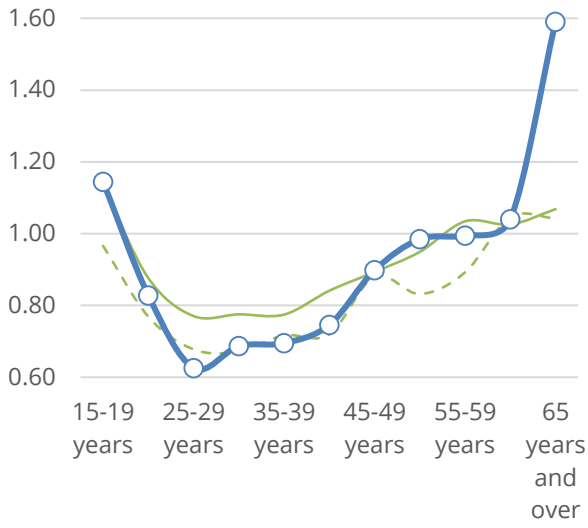
Lower Hutt relative to New Zealand



Source: Statistics New Zealand

FIGURE 153: UNEMPLOYMENT BY AGE: WELLINGTON CITY

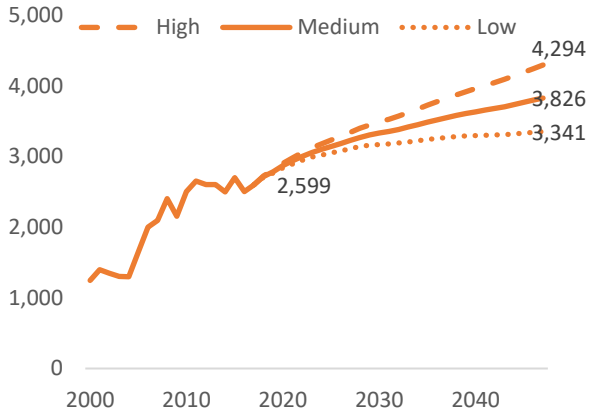
Wellington City relative to New Zealand



Source: Statistics New Zealand

FIGURE 154: UPPER HUTT: GOVERNMENT

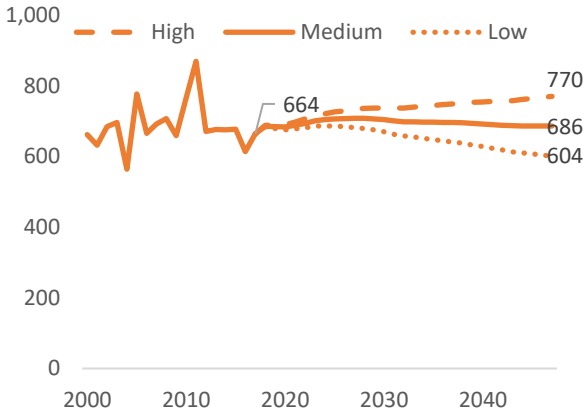
Upper Hutt, Government employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 155: UPPER HUTT OTHER

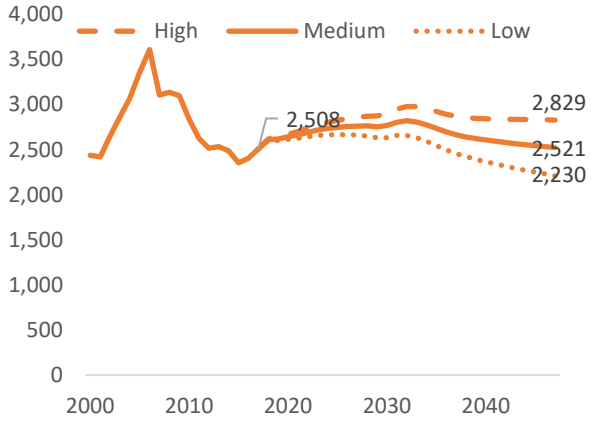
Upper Hutt, "Other" employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 156: UPPER HUTT INDUSTRIAL

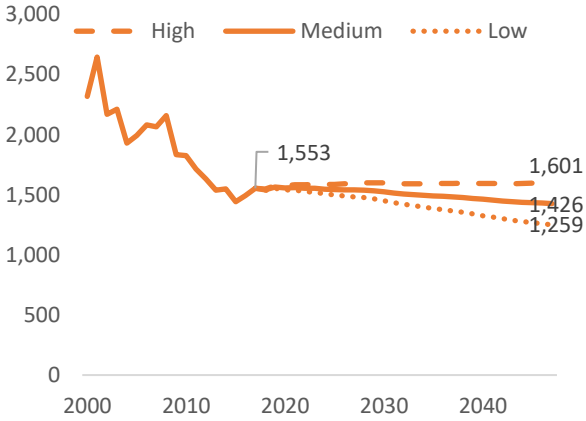
Upper Hutt, Industrial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 157: UPPER HUTT: COMMERCIAL

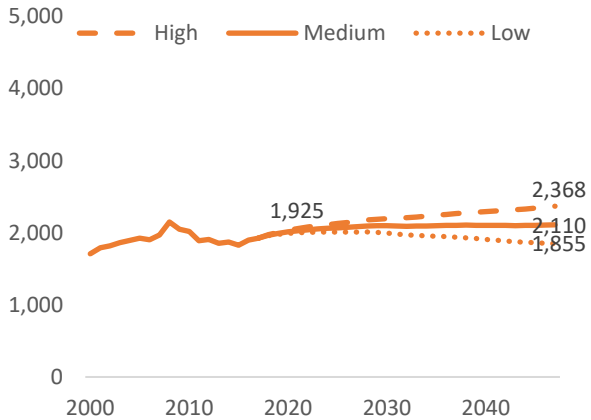
Upper Hutt, Commercial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 158: UPPER HUTT RETAIL

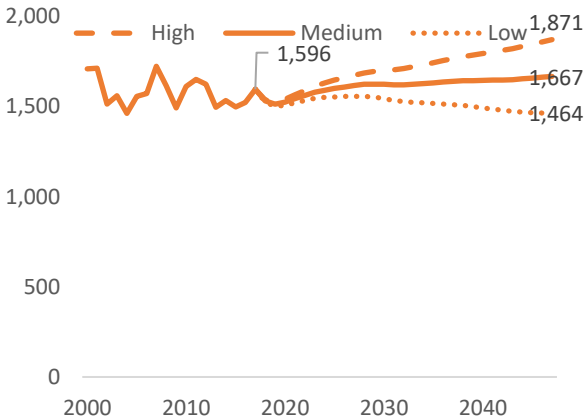
Upper Hutt, Retail employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 159: UPPER HUTT: HEALTH-EDUCATION

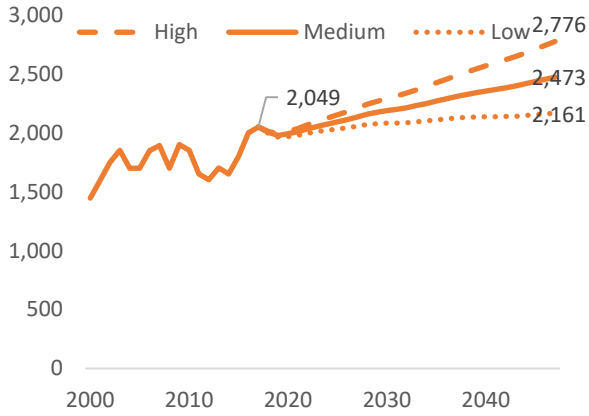
Upper Hutt, Health Educ.& training, employees 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 160: LOWER HUTT: GOVERNMENT

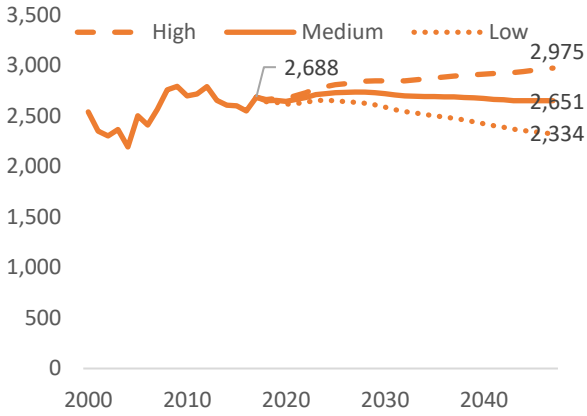
Lower Hutt, Government employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 161: LOWER HUTT OTHER

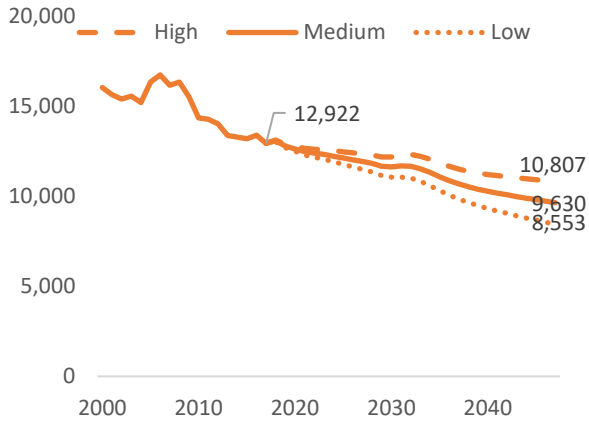
Lower Hutt, "Other" employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 162: LOWER HUTT INDUSTRIAL

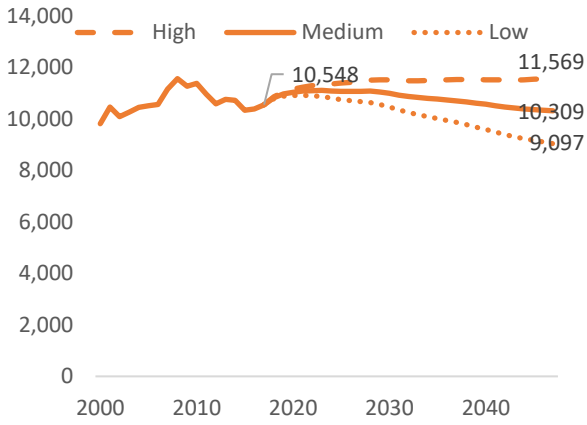
Lower Hutt, Industrial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 163: LOWER HUTT: COMMERCIAL

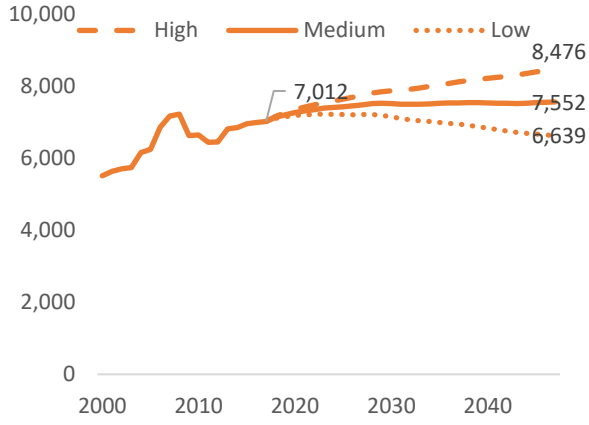
Lower Hutt, Commercial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 164: LOWER HUTT RETAIL

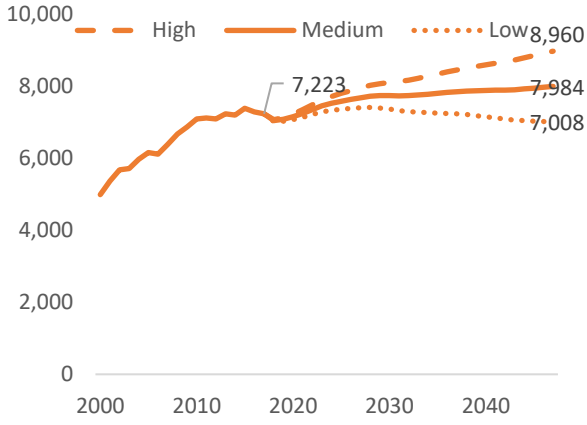
Lower Hutt, Retail employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 165: LOWER HUTT: HEALTH-EDUCATION

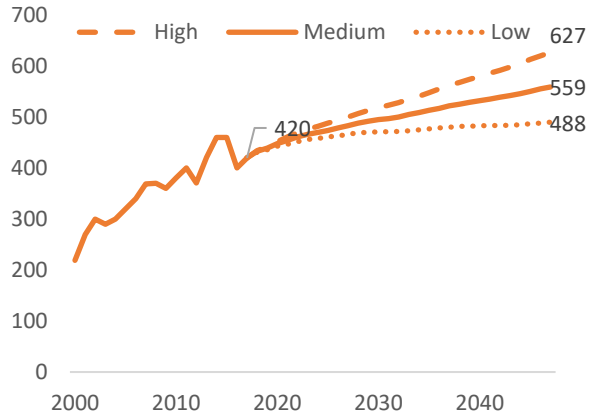
Lower Hutt, Health Educ.& training, employees 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 166: KAPITI: GOVERNMENT

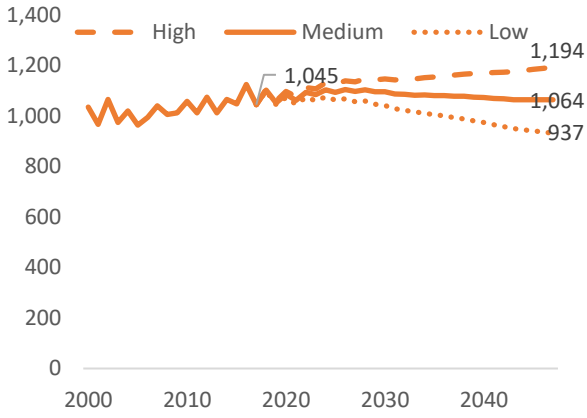
Kapiti, Government employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 167: KAPITI OTHER

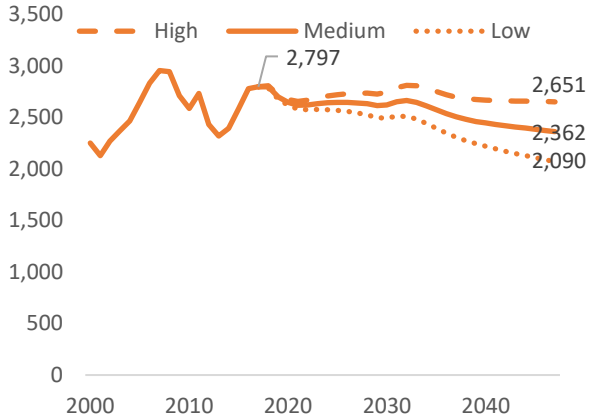
Kapiti, "Other" employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 168: KAPITI INDUSTRIAL

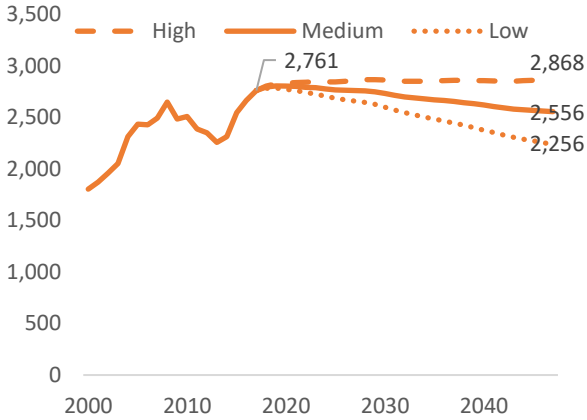
Kapiti, Industrial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 169: KAPITI: COMMERCIAL

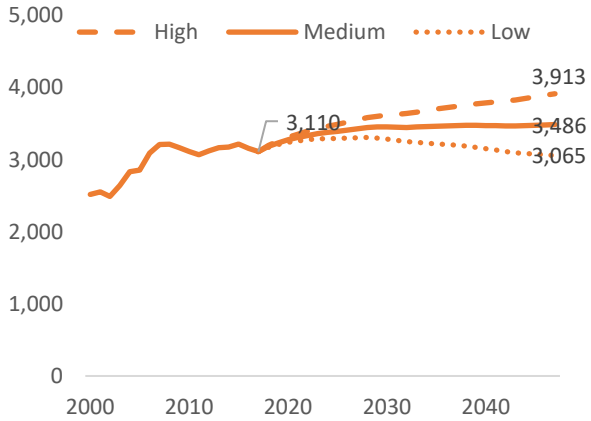
Kapiti, Commercial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 170: KAPITI RETAIL

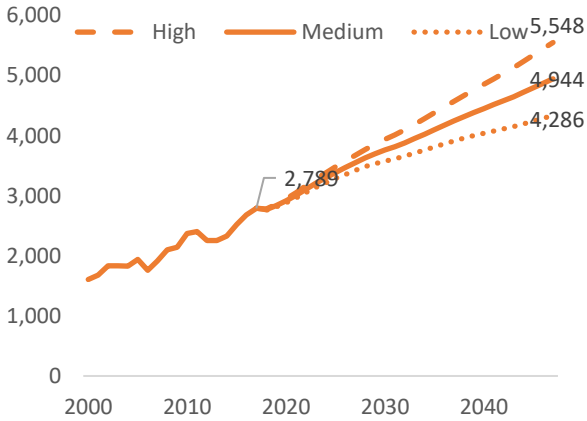
Kapiti, Retail employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 171: KAPITI: HEALTH-EDUCATION

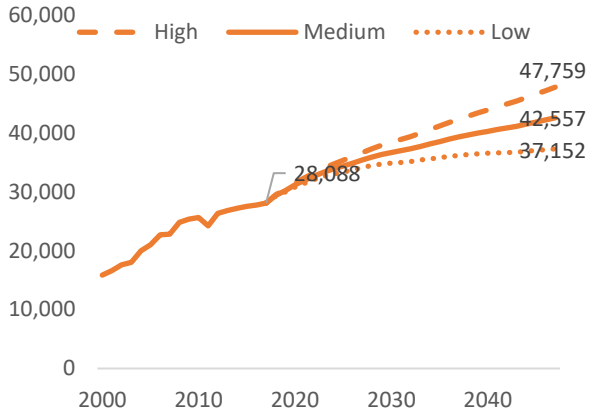
Kapiti, Health Educ.& training, employees 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 172: WELLINGTON CITY: GOVERNMENT

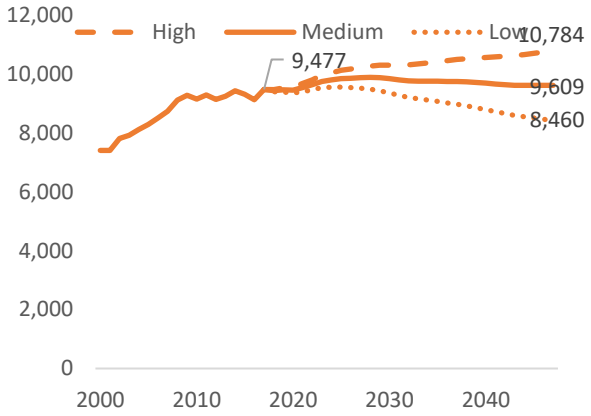
Wellington City, Government employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 173: WELLINGTON CITY OTHER

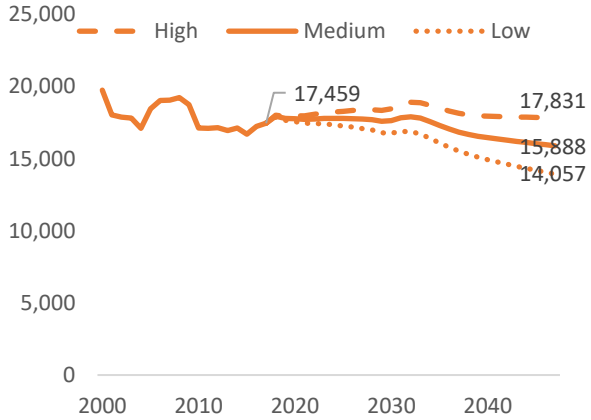
Wellington City, "Other" employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 174: WELLINGTON CITY INDUSTRIAL

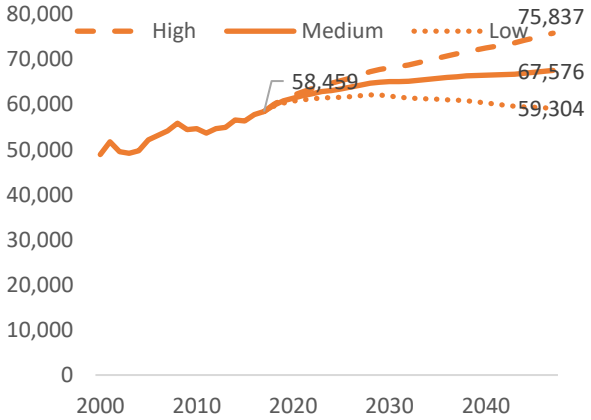
Wellington City, Industrial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 175: WELLINGTON CITY: COMMERCIAL

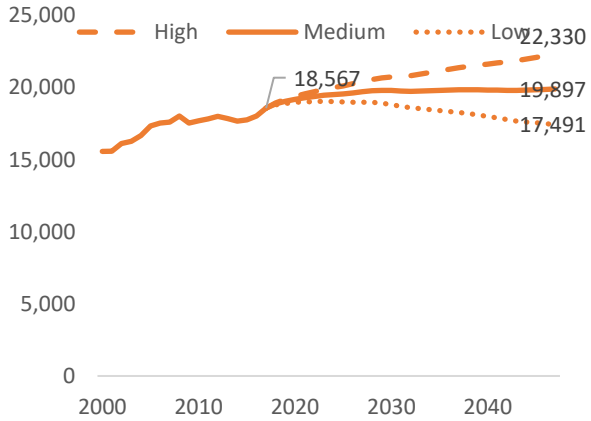
Wellington City, Commercial employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 176: WELLINGTON CITY RETAIL

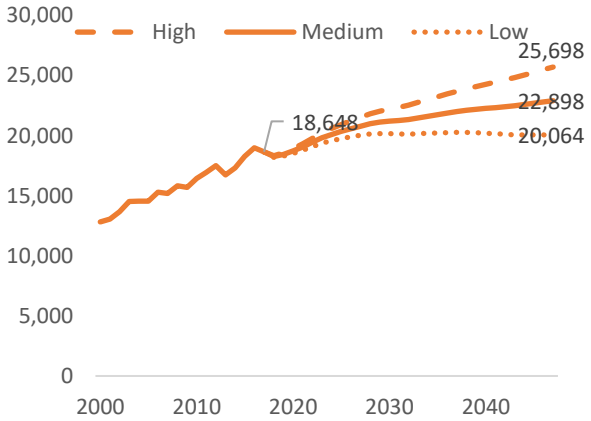
Wellington City, Retail employees, 2000-47



Source: Statistics New Zealand, Sense Partners

FIGURE 177: WELLINGTON CITY: HEALTH ETC

Wellington City, HET, employees 2000-47



Source: Statistics New Zealand, Sense Partners

Appendix 3: The Vector-auto-regressive model

VAR models are a standard economic model that typically work with a small number of variables to uncover the structure of the economy and to produce forecasts of key variables.

One of the key benefits of how we will use our VAR model is there is no need to impose restrictions on the model. Aside from assuming linear interactions, the dynamic interactions across variables are left unrestricted. More technically, we can represent the VAR as:

$$x_t = F_{x_{t-1}} + u_t$$

where x_t is a vector of industry share data derived from yearly employment count data from Statistics New Zealand's business demography database, so the t subscript represents a year.

More precisely, we bundle together health, education and training employment and then construct industrial, commercial, government, and retail categories, grouping all remaining employment into an "other" category. Figure 181 shows the map from ANZSIC categories to our industry groupings. So for our VAR model, x_t includes the following variables:

$$x_t = [h_t, i_t, c_t, g_t, r_t, o_t]$$

where h_t is health, education and training, i_t is industrial employment, c_t is commercial, g_t is government employment, r_t is retail employment and o_t is "other" employment.

In principle, x_t could be expanded to include lags of our employment variables such that our industry employment variables could be related to not just last year's values but values from two years ago. When we test the fit of using additional lags, we find that a model with a single lag provides the best trade-off between matching the data and overfitting the data. Moreover, we include a constant and a trend in our model.

Before including the variables in the model, we test the order of integration of each series to check the variables are stationary using Augmented Dickey-Fuller statistics. Alongside the F-statistics that report the overall fit of each variable in the VAR, we report the results of these tests that show each of the variables are stationary (see Figure 178).

FIGURE 178:THE MODEL FITS THE STATIONARITY DATA VERY WELL

ADF-test results for stationarity and model fit statistics

Test	Health	Industrial	Commercial	Government	Retail	Other
ADF-stat	-2.136	-2.276	-2.727	-1.186	-2.704	0.675
p-value	(0.480)	(0.533)	(0.705)	(0.118)	(0.696)	(0.010)
F-test	114.00	13.2	22.6	134.3	23.31	54.73
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Source: Sense Partners

We use the Akaike-Information Criteria to evaluate the fit of our model. In addition, we test that the residuals from the VAR model are well-behaved, the results of which we present in Figure 53.

FIGURE 179: RESIDUALS FROM THE VAR MODEL ARE NORMAL

Tests for well-behaved residuals

Test	Skewness	Kurtosis	Normality
Test-stat	7.964	5.045	13.009
p-value	(0.241)	(0.538)	(0.368)

Source: Sense Partners

One of the key benefits of our model framework is that we allow for dynamic interactions across the industry shares.

Figure 180 shows the impact on each variable in our VAR from each industry share variable. The figure shows that the Health, Education and Training sector is primarily driven by activity in its own sector (46%). Government sector employment today has only as a small impact (6%) on employment in Health, Education and Training ten years in the future.

FIGURE 180: THE MODEL ALLOWS DYNAMIC INTERACTIONS ACROSS INDUSTRY SHARES

Outlook for economic activity, real GDP, Wellington City

		Driver after ten years					
		Health	Industrial	Commercial	Government	Retail	Other
Variable	Health	46%	7%	20%	6%	13%	8%
	Industrial	10%	26%	10%	10%	23%	20%
	Commercial	8%	22%	24%	10%	18%	18%
	Government	11%	14%	10%	20%	32%	13%
	Retail	16%	18%	9%	8%	33%	16%
	Other	10%	13%	7%	18%	29%	23%

Source: Sense Partners

FIGURE 181: MAP FROM ANZSIC 2006 TO OUR INDUSTRY CATEGORIES

Industry	Commercial	Govt.	Health & Education	Other	Industrial	Retail	Employees June, 2017
A Agriculture, Forestry and Fishing				0.9	0.1		565
B Mining				0.9	0.1		335
C Manufacturing					1		11,130
D Electricity, Gas, Water and Waste Services				0.7	0.3		2055
E Construction					1		13,430
F Wholesale Trade					1		7,320
G Retail Trade						1	19,100
H Accommodation and Food Services	0.15					0.85	17,240
I Transport, Postal and Warehousing					1		6,890
J Information Media and Telecommunications	1						5,685
K Financial and Insurance Services	1						11,450
L Rental, Hiring and Real Estate Services	1						2,600
M Professional Scientific and Technical Services	1						29,640
N Administrative and Support Services	1						11,770
O Public Administration and Safety		1					34,010
P Education and Training	0.25		0.75				20,900
Q Health Care and Social Assistance	0.25		0.75				25,090
R Arts and Recreation Services	0.25			0.75			5,700
S Other Services				1			8,210

Source: Statistics New Zealand, Sense Partners

Appendix 4: Allowable business activities by zone

FIGURE 182: EACH COUNCIL IN THE REGION ALLOWS A DIVERSE SET OF BUSINESS ACTIVITIES, BUT UNDER DIFFERENT BUSINESS ZONING DEFINITIONS

Council	Zoning area	Local Council Description	Area
Kapiti coast	Industrial	The district allows a range of industrial activities including manufacturing, light industry, fabricating, processing and servicing and repair of goods. The great majority of these are within the land zoned industrial/service.	114.8
	District Centre	The Paraparaumu District Centre is intended to serve as a focal point for the district. Integration of retail and commercial activities with community (cultural and recreational), civic amenities and facilities and residential activities in a district core.	68.5
	Outer Business Zone	Provides for compatible commercial activities and some retail activities on the periphery of the district centre.	26.2
	Town Centre	Enables retail activities that provide 'convenience' goods and a range of 'comparison' goods to serve the major weekly household shopping needs of the local community, as well as a range of other business, cultural and community facilities and services.	20.7
	Local Centre	To provide a mix of limited local retail activities, other business activities, facilities and services which serve the daily convenience needs of local communities, generally within a walkable distance.	4.9
Lower Hutt	General Business	A range of industrial and commercial activities are accommodated. Certain retailing activities are permitted outside the main commercial centres, due to their nature and character. For example, kit set garages, caravans, trailers and boats. Natural materials are included where they are sold in bulk, such as gravel, shingle, rock, concrete, coal, fire wood and timber	294.1
	Special Business	To protect the community and the receiving environment from the risk associated with the location and operation of hazardous facilities in Seaview/Gracefield	148.7
	Central Commercial		36.6
	Petone Commercial 2	To provide for a mixed-use activity area within Petone which caters for a range of complementary commercial, small-scale or low intensity light industrial, business & service activities, residential & large format retail activities.	28.5
	Avalon Business	The principal activity has been television production and broadcasting, as well as a range of media and communication activities. A mix of activities not necessarily associated with television and film production and broadcasting activities, but consistent with their effects, is appropriate. Includes: telecommunications, office,	9.5

122

Council	Zoning area	Local Council Description	Area
		industrial activities related to TV and broadcasting, service industry, cottage industry, research, warehousing, recreation, education, emergency facilities.	
	Petone Commercial 1	Small scale activities are permitted on Jackson Street generally between Victoria and Cuba Streets so that there is no likelihood of encroachment into adjoining residential activity areas and adverse effects, such as adverse traffic effects, are managed.	6.1
	Suburban commercial	Provides for a range of retail and commercial activity to meet the needs of residents, activities which provide a community focus, light industrial activities of a workshop nature where an associated retailing activity is maintained at the front of the shop.	21.5
Upper Hutt	Business Industrial	The Commercial Sub-zone focuses on retail and service functions which support the local community. Within this sub-zone, the CBD accommodates a variety of activities in a compact, convenient layout which is characterised by pedestrian-orientated traffic. Commercial activities are also provided for in Silverstream and other suburban areas. These areas provide for a limited range of shopping and business needs. The smaller neighbourhood shops, including dairies, provide for day-to-day convenience shopping.	132.6
	Business Commercial	The Industrial Sub-zone incorporates land which is used for a range of larger scale industrial, warehousing, storage and commercial activities which are vehicle rather than pedestrian orientated. There are limited retail activities within these areas and the environmental standards are less stringent than those within Commercial .	45.3
Wellington City	Business Two	Traditional business areas where a range of industrial activities including warehousing, manufacturing and commercial services can occur. Because of the industrial nature of the activities in such areas, lower levels of amenity are acceptable compared with other areas. Residential and some retail activities are restricted.	148.1
	Central Area	It is a vibrant mix of inner-city living, entertainment, and commercial activity. It attracts arts, cultural and recreational events of local, national and international repute. Major infrastructure and facilities that contribute to the city's economic base are located within the Central Area.	233.1
	Business One	Contain a range of uses including: employment activities, light industrial, commercial and business services, recreational, residential and entertainment uses, and local community services. In some cases, retail activities are also appropriate.	66.9
	Centre	Centres range from large shopping centres to small clusters of shops. They have multiple functions and activities, but their core is providing localised shopping and services that complement the Central Area.	70.7
	Curtis St Business	Specifically provide for and encourage a range of commercial activities in the Curtis Business Street Area. Control the establishment of large integrated retail developments and large supermarkets.	1.1

123

Appendix 5: Using consent data

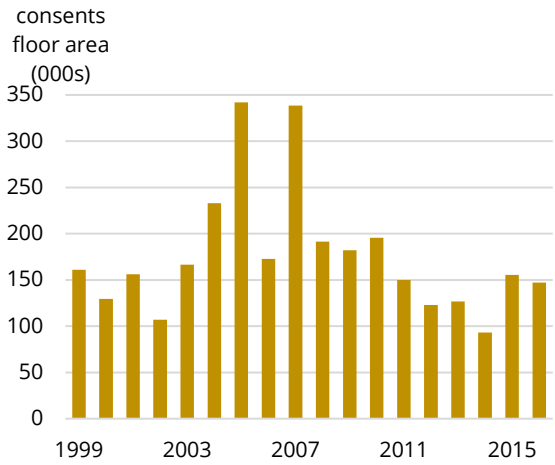
FIGURE 183: MAP FROM CONSENT DATA CATEGORIES TO OUR INDUSTRY CATEGORIES

Industry	Commercial	Govt.	Health & Education	Other	Industrial	Retail	Consented area 2016
Hotels	0.15					0.85	19,475
Health			1				2,250
Education			1				8,140
Social				1			8,316
Shops						1	17,479
Office	0.5	0.5					49,457
Storage					1		7,521
Factories					1		23,164
Farms				1			18,632

Source: Statistics New Zealand, Sense Partners

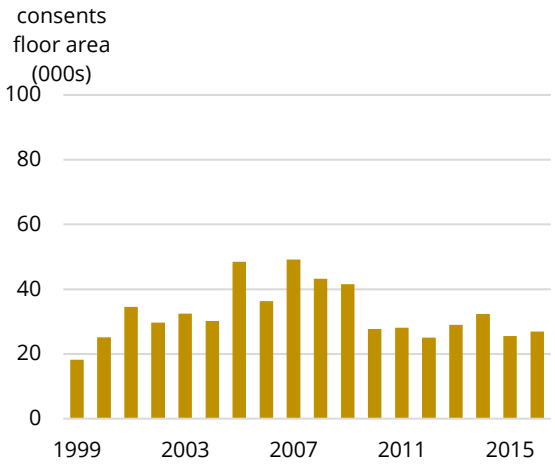
Figure 184 to Figure 189 show the history of consent data according to these categories.

FIGURE 184: COMMERCIAL CONSENTS



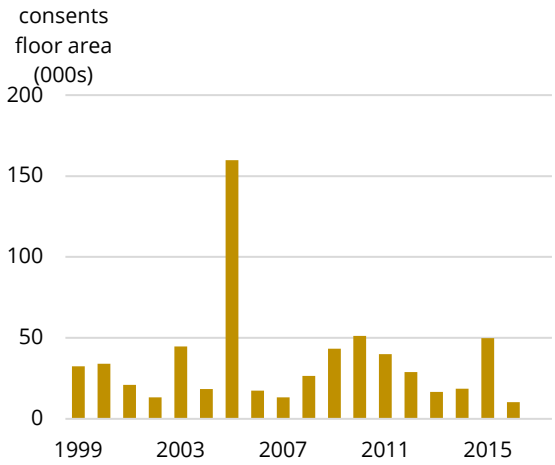
Source: Statistics New Zealand

FIGURE 185: OTHER CONSENTS



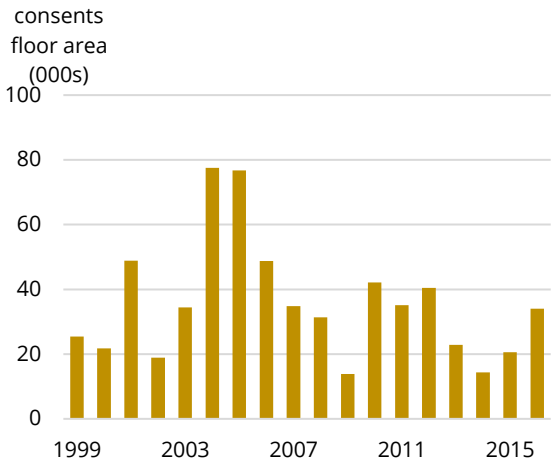
Source: Statistics New Zealand

FIGURE 186: HEALTH & EDUCATION CONSENTS



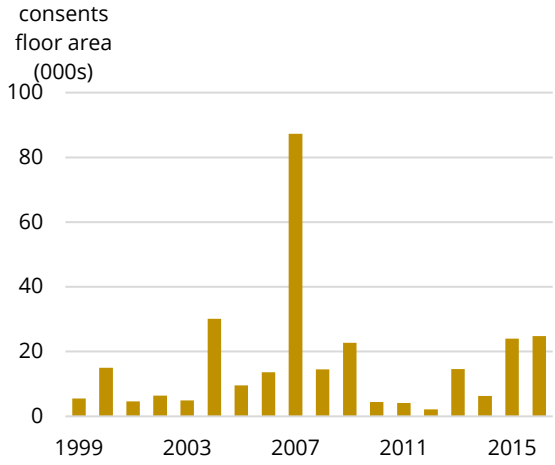
Source: Statistics New Zealand

FIGURE 187: RETAIL CONSENTS



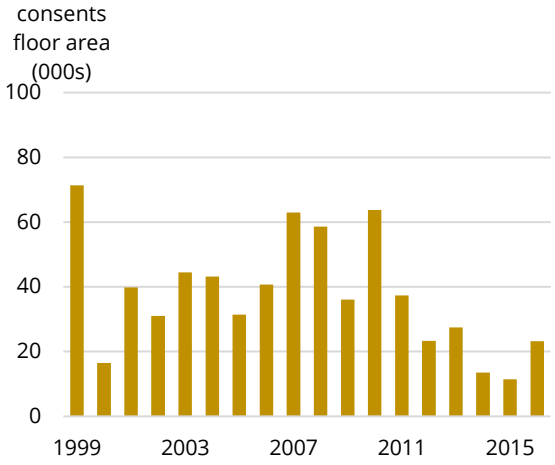
Source: Statistics New Zealand

FIGURE 188: GOVERNMENT CONSENTS



Source: Statistics New Zealand

FIGURE 189: INDUSTRIAL CONSENTS



Source: Statistics New Zealand

Appendix 6: GIS analysis

We undertook the following steps to transform the data and, in some cases, correct errors in the underlying data:

1. Discard roads and water bodies from the LINZ parcel database. In some cases, 'slivers' of land near road reserves remained in the LINZ dataset.
2. Match ratings information to LINZ parcels. If 90% of parcels fall in one zoning area, the entire parcel is coded to that zone. Otherwise, the parcel is split between zones.
3. Match LIDAR building footprint / building height data to LINZ parcels and calculate the area of building footprint within each parcel. If a building footprint crosses over two parcels, it is split between them.
4. Match ratings data on capital and land values and existing building floorspace to LINZ parcels. As there is a 'many to many' relationship between ratings units and parcels, this entailed:
    - proportionately allocating ratings unit data to parcels based on share of land area in cases where ratings units overlapped multiple parcels,
    - summing up values for all ratings units to the underlying parcel where multiple ratings units were present on a single parcel.

      There were cases where the format of the underlying data resulted in errors. For instance, each tenancy in an office building may have the entire building area recorded against it, rather than the area of the individual tenancy.

      In these cases, the summed values were divided by the number of ratings units, which often (but not always) resulted in a plausible result.
5. Many additional variables were created using the underlying data. This included:
    - An estimated floor area ratio using ratings database information on floor area (FAR-ratings)
    - An estimated site coverage ratio using LIDAR building footprints (SCR-LIDAR)
    - An estimated floor area using LIDAR data on building footprints and building heights (FAR-LIDAR) by dividing building height in metres by an average ratio. To estimate total floor area per building we use 3.4 metres per storey to estimate building storeys and then multiply by building footprint
    - The ratio of land value to capital value based on ratings data (LV/CV ratio). This is measure the building investment that has occurred on each site.
    - The estimated value of improvements on sites (IV), that is, CV minus LV.
6. Several filters were also created to exclude sites with erroneous ratings information or sites that are likely to be too small to be developable.

Relationships between these measures

Several sources of data on existing buildings are incomplete. To estimate FARs by activity and zone, we need to extrapolate FARs for sites in Upper Hutt.

To that end, we analyse correlations between ratings valuations, ratings database information on building area, and LIDAR data on building footprints and height.

Kapiti also provided additional information on its business areas to support analysis of measures, including FARs. This information was based on property ownership and includes aggregated data on LINZ parcels. This enabled rating information and additional GIS information to be used to complement and fill gaps in analysing measures.

Ratings data versus LIDAR data

First, we consider the correlation between two measures of FARs at the site level – FAR-ratings and FAR-LIDAR. The following diagram shows this correlation for Wellington City and Lower Hutt City, excluding several sites where there appeared to be large errors in the ratings database estimates of building area that could not be resolved with GIS analysis.

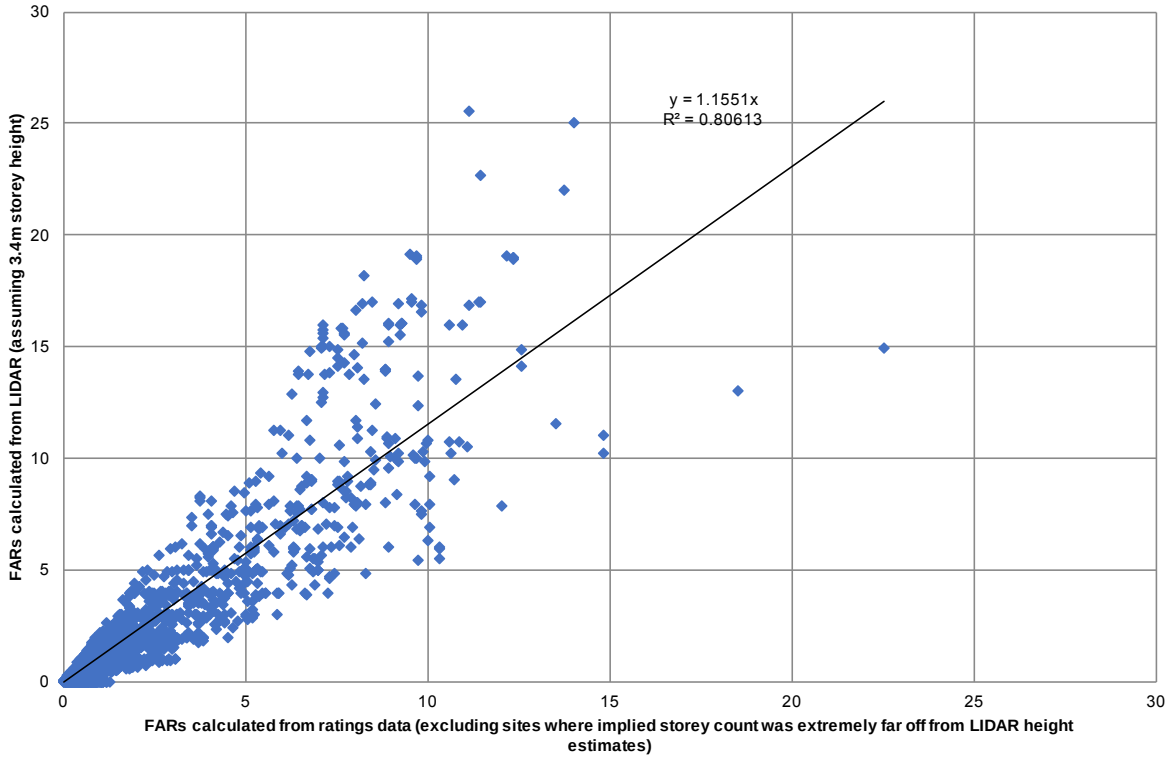
Figure 190 show there is a strong positive correlation between these measures, albeit with heteroscedasticity. However, this data indicates that there is likely to be upward bias in estimates of floor area derived from LIDAR data. This may reflect:

(a) upper levels of buildings that are smaller than lower levels, and

(b) storey heights that vary between buildings.

FIGURE 190: OUR 2 MEASURES OF BUSINESS LAND FARS ARE CORRELATED

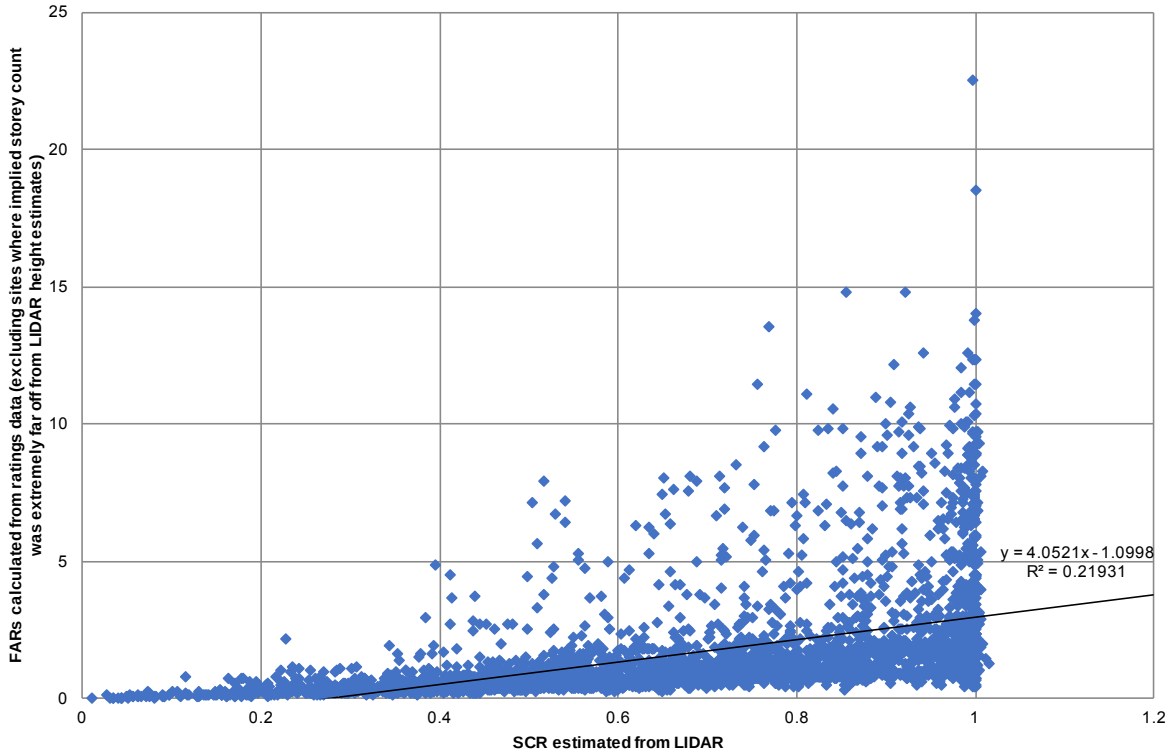
Relationship between 2 measures for business land in Wellington City and Lower Hutt City



Source: MR Cagney

Second, we considered the correlation between FARs and site cover ratios. In general, we would expect some correlation between these measures, as FARs are roughly equal to SCRs multiplied by building height, but not a very strong relationship. Figure 121 shows that this is as expected. We therefore suggest that SCRs cannot be used as a close proxy for FARs, except in limited situations where there are no buildings over one storey in height.

FIGURE 191: SCRS CAN ONLY BE A CLOSE PROXY IN LIMITED SITUATIONS
FAR ratings and SCR-LIDAR for business land in Wellington City and Lower Hutt City



Source: MR Cagney

So, for our analysis:

- LIDAR data can be used as a substitute for ratings valuation data on floor area, but needs to rescaled using the trend line in Figure 191.
- Unless development is predominantly single-storey, such as in industrial zones or large format retail, site cover ratios cannot be used as a proxy to estimate FARs

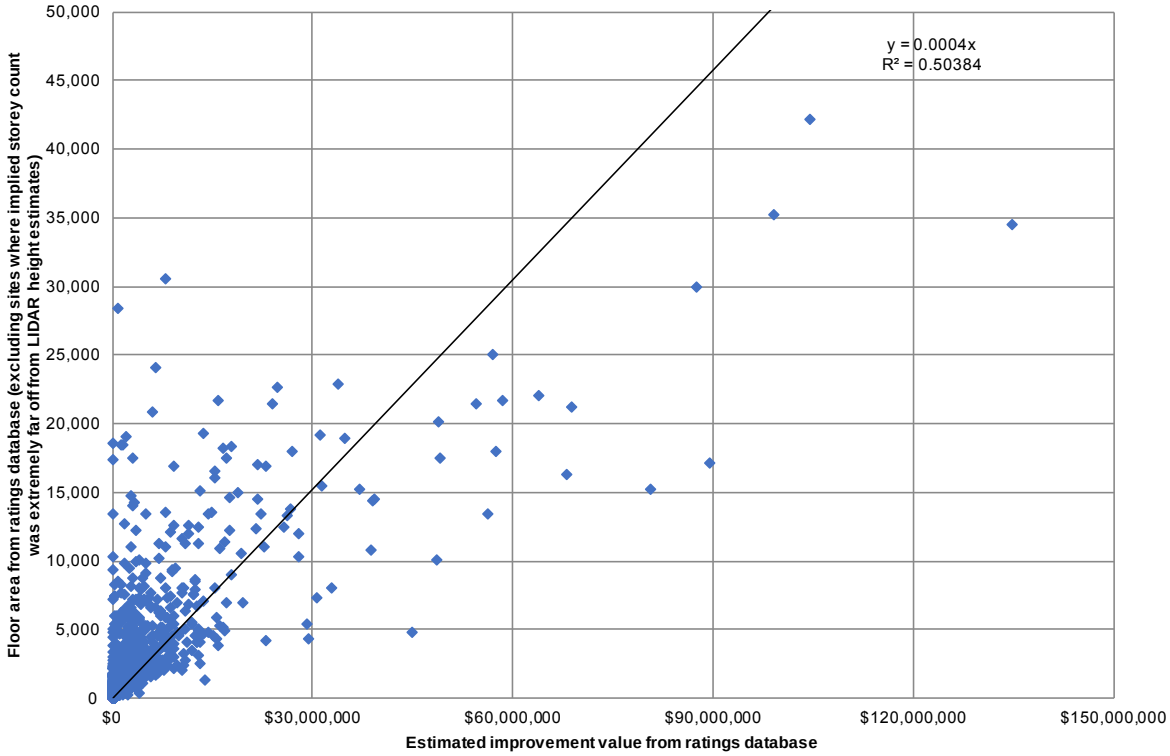
FARs and ratings valuations

Next, we test if ratings valuations can be a proxy for FARs. Figure 192 shows the two measures have the expected positive correlation, with good fit, albeit with some heteroskedasticity.[17] The trend-line shows each additional square metre of floorspace has an additional $2500 of improvement value. This is intuitively sensible – close to the average cost to build floorspace.

[17] Here, heteroskedasticity is likely to reflect buildings that are run-down and have less value.

FIGURE 192: RATING VALUATION CAN PROXY FOR FARS

Floor area and improvement value for business land in Wellington City and Lower Hutt City



Source: MR Cagney

To make an estimate of the quantity of floorspace on sites in Upper Hutt City, we:

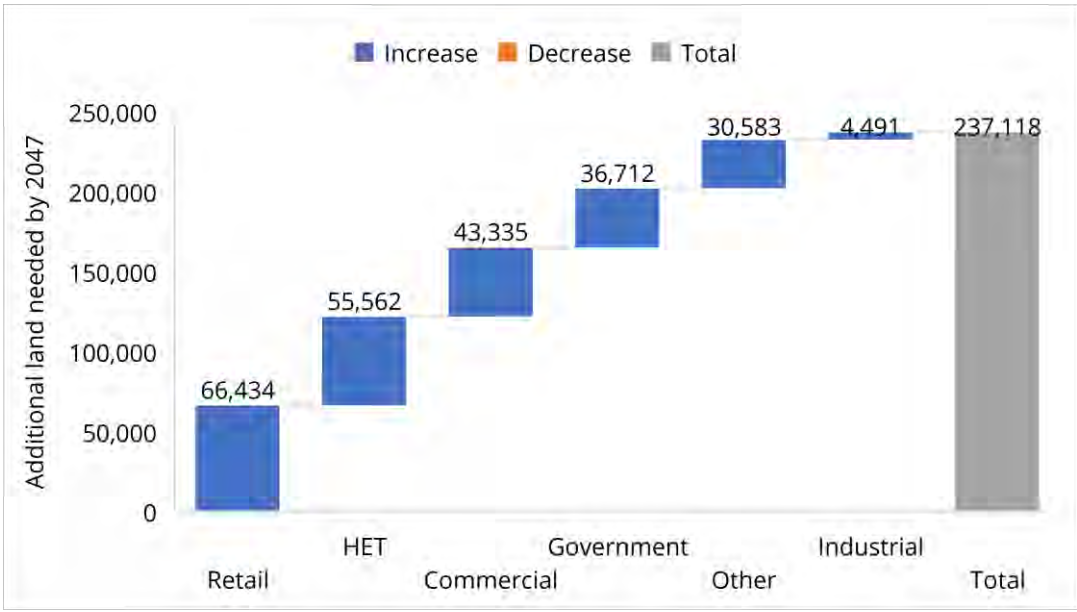
- use ratings valuations to estimate the value of improvements on sites
- exclude sites with 'implausible' ratings valuations, likely to reflect data coding errors
- convert valuations to estimated floorspace using the ratio of $2500 per square metre.

Our estimates of floorspace are likely to be imprecise one a site-by-site basis since they under-estimate floorspace for sites with older buildings that are relatively more dilapidated. However, the line of best fit shows our relationship captures a large share of variation in the data.

Appendix 7: Land demand by council

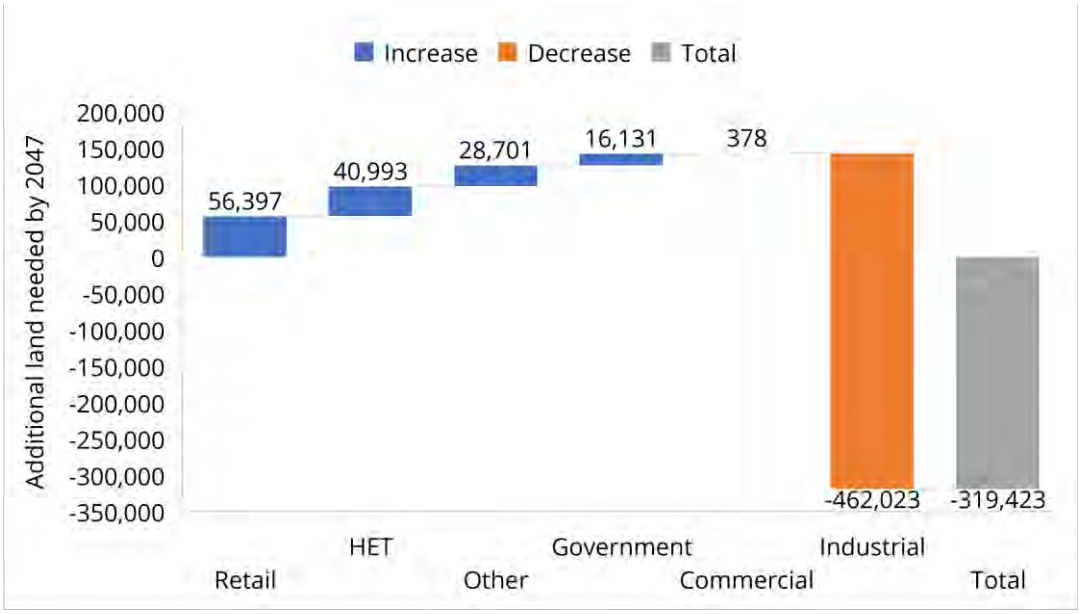
forecast.id population scenario

FIGURE 193: FORECAST.ID NUMBERS SUGGEST SIMILAR BUSINESS LAND DEMAND
Wellington City, Growth in demand for business land, 2000-2047, forecast.id scenario



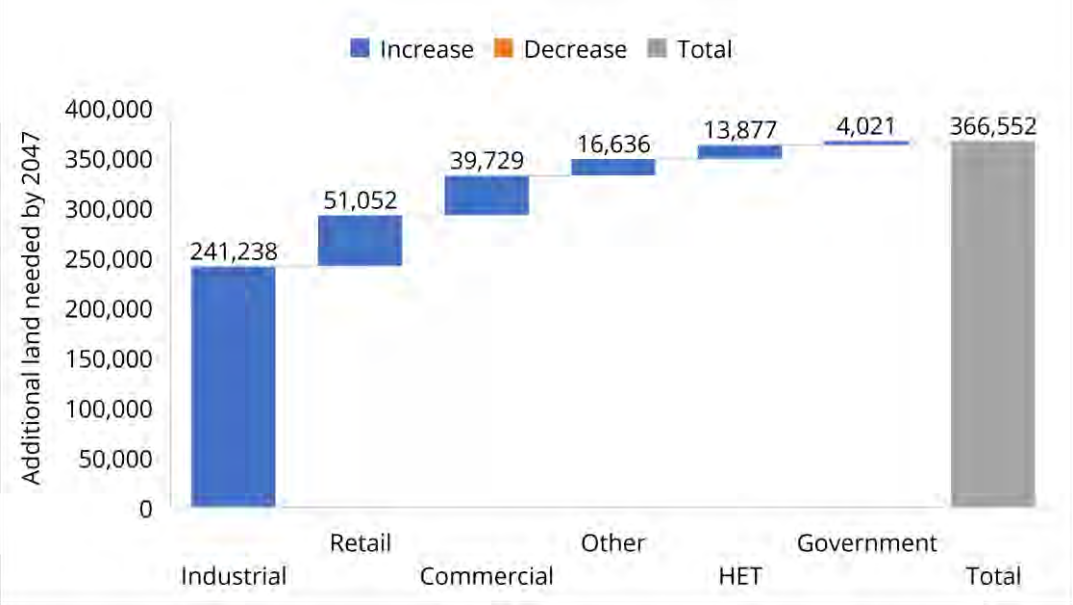
Source: Sense Partners

FIGURE 194: MORE PEOPLE LIFTS DEMAND FOR INDUSTRIAL LAND IN LOWER HUTT
Lower Hutt, Growth in demand for business land, 2000-2047, forecast.id scenario



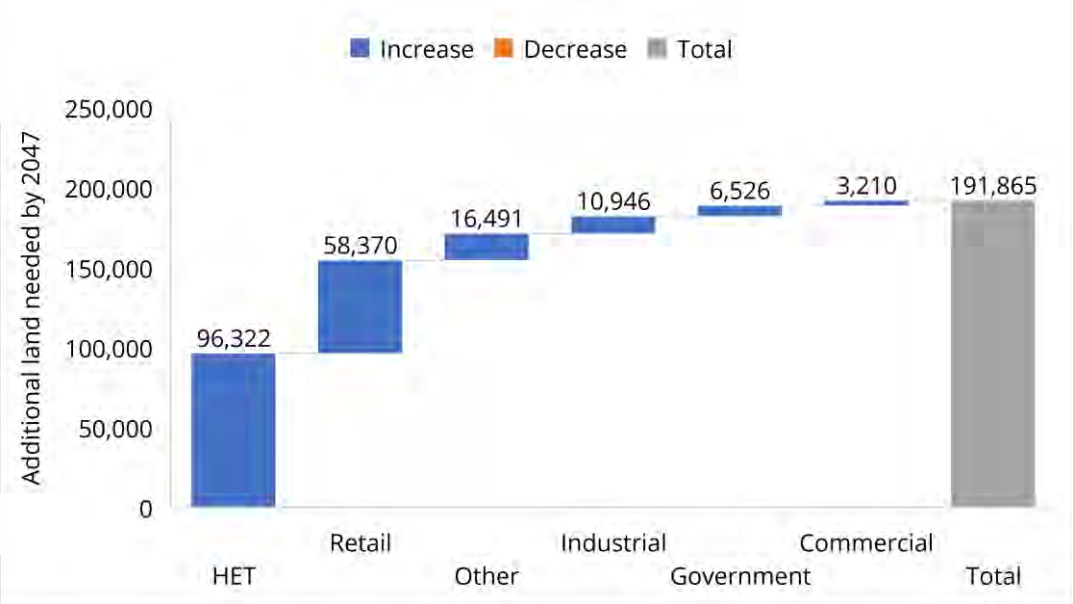
Source: Sense Partners

FIGURE 195: INDUSTRIAL LAND REQUIREMENTS SHAPE UPPER HUTT OUTLOOK
Upper Hutt, Growth in demand for business land, 2000-2047, forecast.id scenario



Source: Sense Partners

FIGURE 196: FORECAST.ID EXPECTS MORE PEOPLE TO HIT KAPITI LIFTING DEMAND
Kapiti Coast, Growth in demand for business land, 2000-2047, forecast.id scenario

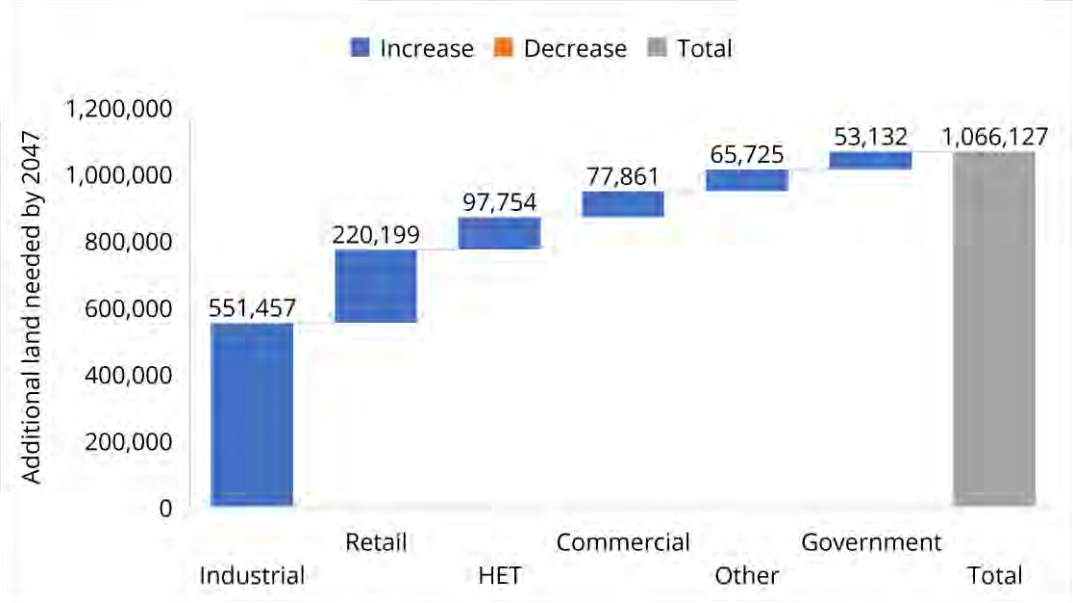


Source: Sense Partners

Statistics New Zealand high population scenario

FIGURE 197: HIGHER POPULATION GROWTH WOULD SIGNIFICANTLY LIFT DEMAND FOR BUSINESS LAND IN WELLINGTON CITY

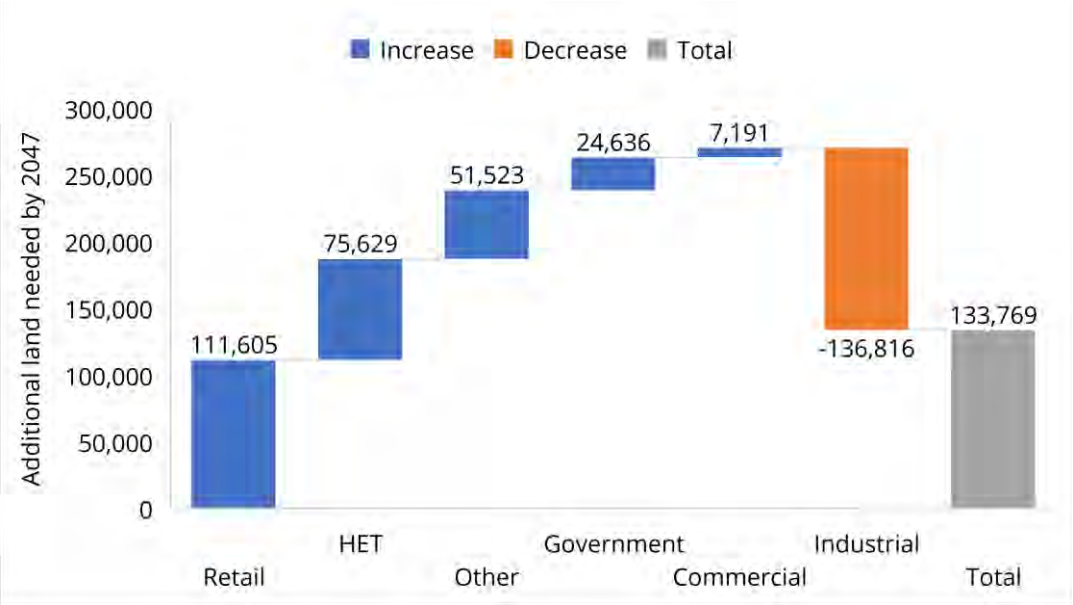
Wellington City, Demand for business land, 2000-2047, High population scenario



Source: Sense Partners

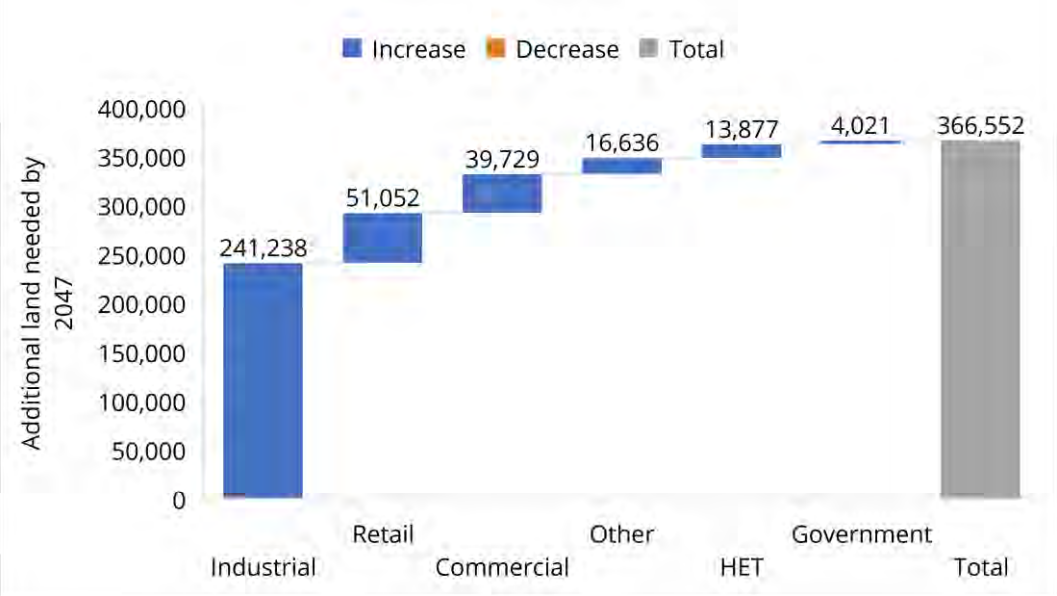
FIGURE 198: POPULATION GROWTH OFFESTS LOWER HUTT'S INDUSTRIAL DECLINE

Lower Hutt, Demand for business land, 2000-2047, High population scenario



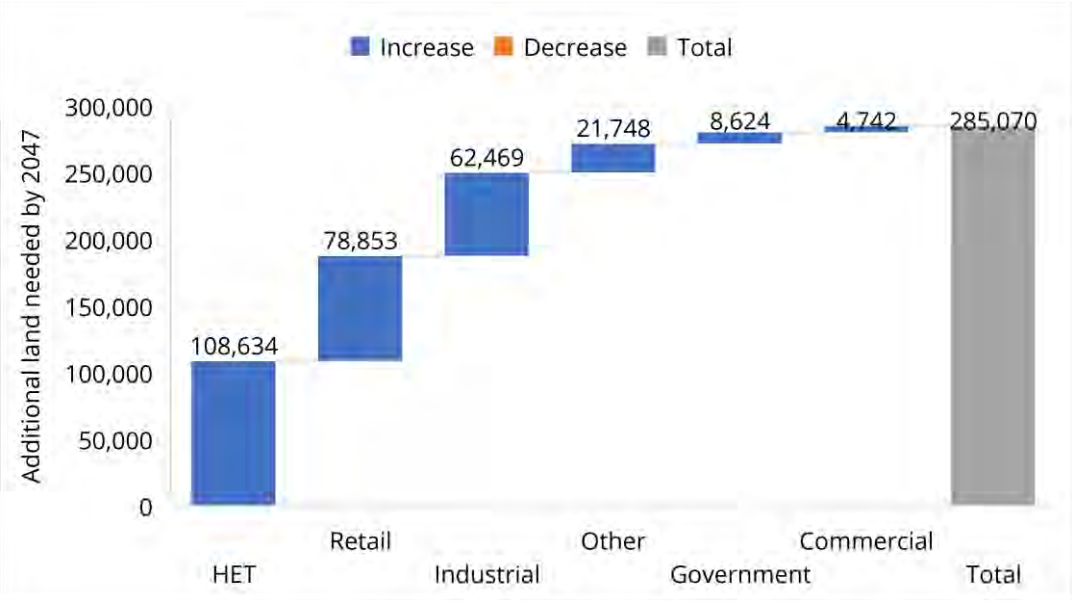
Source: Sense Partners

FIGURE 199: A GROWING POPULATION PRESSURES DEMAND HIGHER IN UPPER HUTT
Upper Hutt, Demand for business land, 2000-2047, High population scenario



Source: Sense Partners

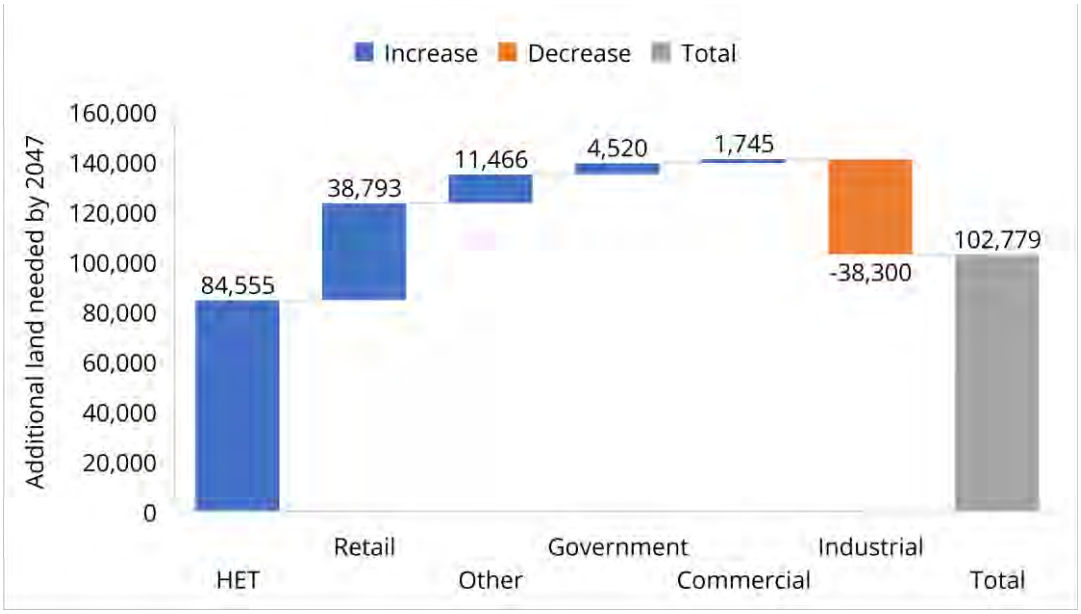
FIGURE 200: STRONG KAPITI POPULATION GROWTH LIFTS BUSINESS LAND DEMAND
Kapiti Coast, Business land demand, 2000-2047, High population scenario



Source: Sense Partners

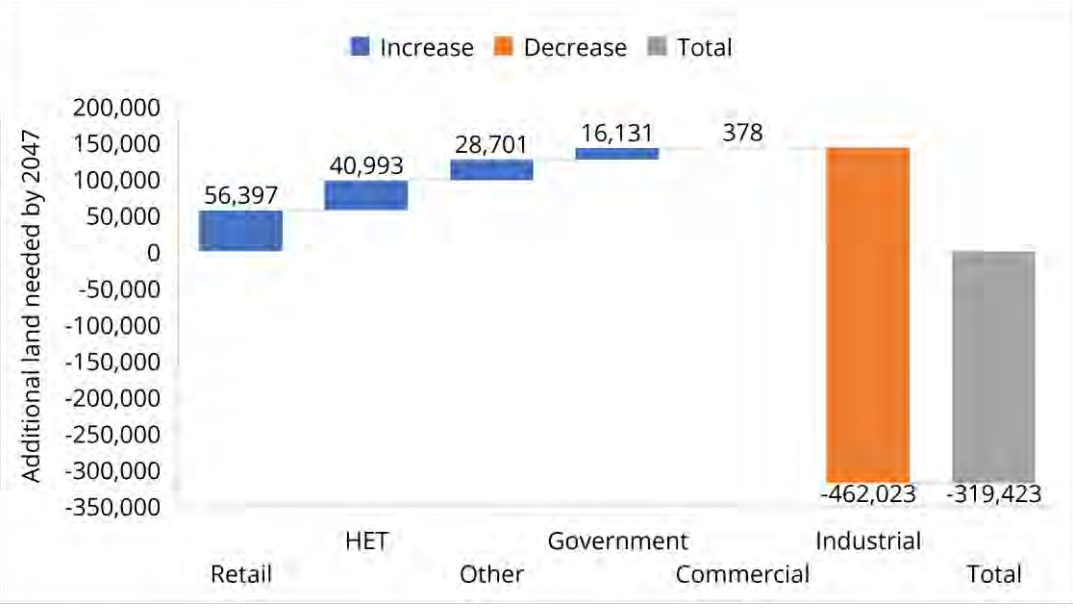
Improved transport scenario

FIGURE 201: ADDITIONAL POPULATION GROWTH RAMP UPS BUSINESS LAND NEEDS
Kapiti Coast, Demand for business land, 2000-2047, improved transport scenario



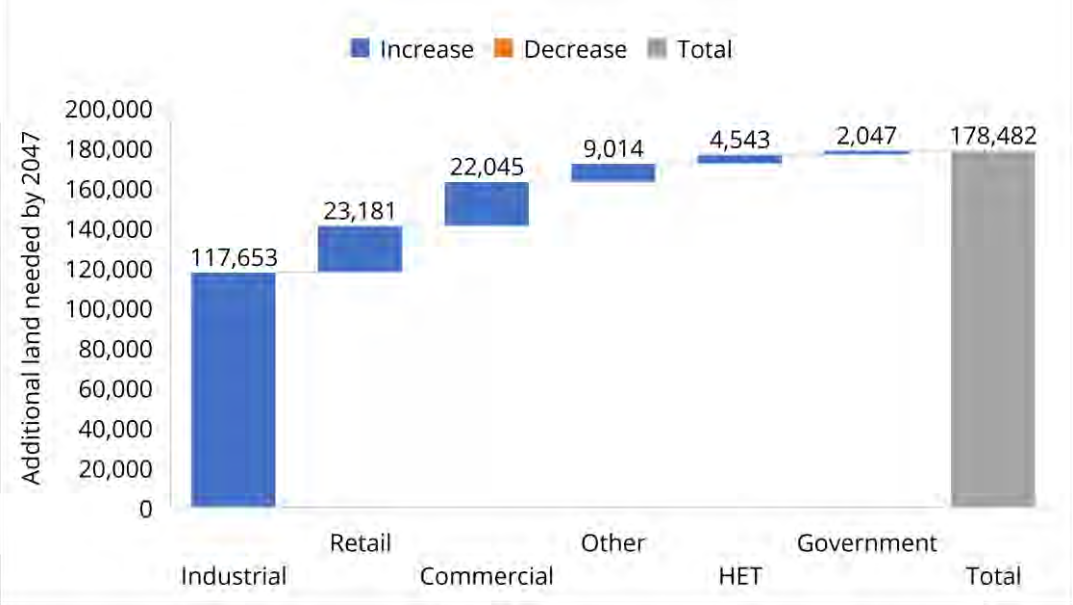
Source: Sense Partners

FIGURE 202: DEMAND FOR INDUSTRIAL LAND IN LOWER HUTT IS NOT AS LOW
Lower Hutt, Demand for business land, 2000-2047, improved transport scenario



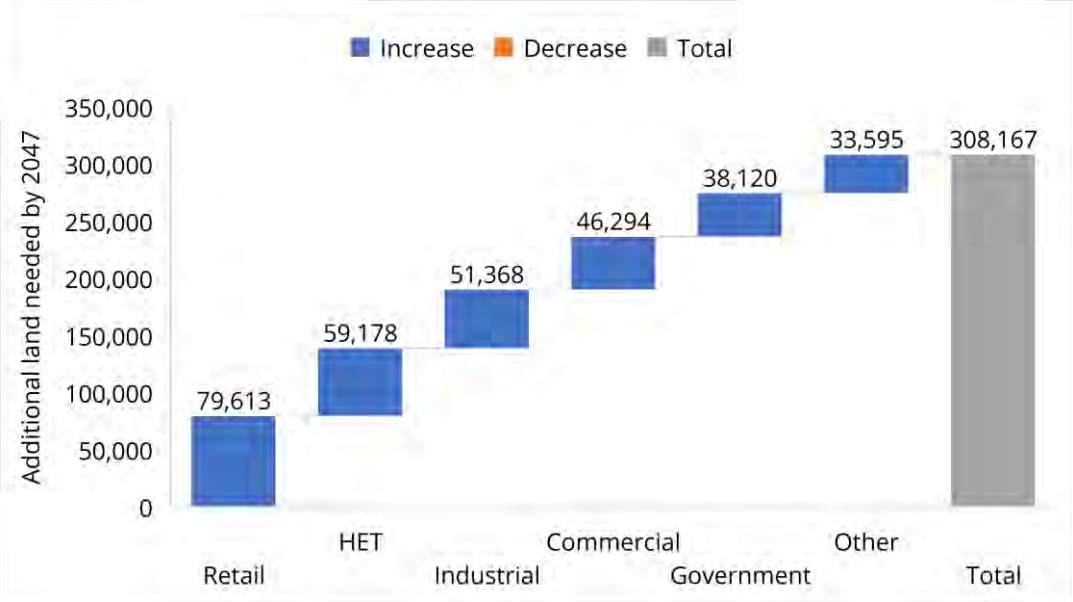
Source: Sense Partners

FIGURE 203: INDUSTRIAL LAND REQUIREMENTS CHANGE IN UPPER HUTT
Upper Hutt, Demand for business land, 2000-2047, improved transport scenario



Source: Sense Partners

FIGURE 204: EXPECT MODEST FLOORSPACE DEMAND GROWTH FROM OTHER FIRMS
Wellington City, Demand for business land, 2000-2047, improved transport scenario



Source: Sense Partners