



Agenda for Workshop No. SG17/05

SmartGrowth Leadership Group

**The SmartGrowth Leadership Group will meet in the
Tauranga City Council Chambers
91 Willow Street, Tauranga
on
Wednesday, 17 May 2017
at 9.00am**

**G Poole
Chief Executive
Tauranga City Council – Administering Authority**



SmartGrowth Leadership Group

Committee Members

Independent Chairperson:	Bill Wasley
Bay of Plenty Regional Council:	Chair Cr Doug Leeder Cr Jane Nees Cr Paula Thompson Cr Stuart Crosby
Tauranga City Council:	Mayor Greg Brownless Cr Larry Baldock Cr Leanne Brown Cr Terry Molloy
Western Bay of Plenty District Council:	Mayor Garry Webber Cr Mike Williams Cr Don Thwaites Cr John Scrimgeour
Tangata Whenua Representatives:	Maru Tapsell Irene Walker Buddy Mikaere Puhirake Ihaka
NZ Transport Agency	Parekawhia McLean
Quorum:	9
Meeting Frequency:	At least bi-monthly

Role

Pursuant to Clause 30 Schedule 7 of Government Act 2002, a joint Committee of Tauranga City Council, Western Bay of Plenty District Council and Bay of Plenty Regional Council shall be retained to implement the SmartGrowth Strategy and Implementation Plan.

Membership

- That representation be comprised of four elected member representatives as appointed by the contributing authorities, including the Mayors and Regional Council Chairperson, and four representatives be nominated by tangata whenua.
- That an Independent Chairperson, to be appointed by the Committee, chairs the Committee; and the appointment of a Deputy Chair from the committee membership.
- That the standing membership is limited to seventeen members, but with the power to co-opt up to a maximum of three additional non-voting members, where required, to ensure the effective implementation of any part, or parts, of the Strategy.

- That NZTA be represented through its Regional Director as an observer with speaking rights but in a non-voting capacity.

Purpose

That the joint SmartGrowth Leadership Group be the delegated authority to implement the SmartGrowth Strategy and Implementation Plan in accordance with the following functions:

Implementation

- Overseeing the implementation of the 2013 SmartGrowth Strategy updates, in particular the strategic actions.
- Ensuring organisation systems and resources support the strategy implementation.
- Taking responsibility for progress of those actions specifically allocated to the “SmartGrowth Leadership Group” in the strategy, and making sure the implementation does occur.
- Monitoring and reporting progress against milestones and budget.
- Overseeing the management of the risks identified in implementation.
- Approving an annual implementation plan with a 3 year horizon.

Ongoing Tasks

- Champion integration and implementation through partner strategies, programmes, plans and policy instruments (including the Regional Policy Statement, Regional and District Plans, Long Term Plans (LTP’s), Annual Plans, transport plans and triennial agreements), and through partnerships with other sectors such as health, education and business.
- Approving submissions to Local Authorities, Central Government, and other agencies on SmartGrowth related matters.
- Reviewing and recommending adjustments to the strategy if circumstances change.
- Identifying and resolving any consultation inconsistencies between the SmartGrowth strategies and subsequent public consultation processes of the partner councils.

Consultation / Partner Forums

- Facilitating consultation with the community.
- Establishing and maintaining the SmartGrowth Partner Forums.
- Agreeing any memorandum of agreements between SLG and any forums.

Committee Operations

- Selecting and appointing an Independent Chairperson and a Deputy Chairperson.
- Implementing a Memorandum of Agreement, as adopted by the Committee for each triennial period, to provide and maintain partnerships and provide for the resolution of any conflict.
- Establish protocols to ensure that implementation, where necessary, is consistent, collaborative, and / or coordinated to achieve optimal outcomes



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Wednesday 17 May 2017

9.00am

Tauranga City Council Chambers

91 Willow Street, Tauranga

Apologies

Business

- 1. SmartGrowth Progress Report Draft Indicator Framework – discussion and feedback**
Bernie Walsh, SmartGrowth/Carole Canler, Canler Consulting
Papers A and B

- 2. Follow up to intensification tour (May 1) – debrief and further discussion on strategic issues**
Michael Tucker, Tauranga City Council/Doug Spittle, Tauranga City Council
Papers C, D, E, F



Committee Name	SmartGrowth Leadership Group
Committee Meeting Date	17 May 2017
Author (s)	Bernie Walsh, Implementation Manager
Purpose	Overview – Developing a progress indicator framework for the SmartGrowth Strategy and Partnership

SmartGrowth Strategy – measuring progress

The SmartGrowth Strategy 2013 does not have a monitoring framework in place against which the Partnership can measure the impact of its actions.

If the Partnership is concerned about not just *taking action*, but also understanding whether those actions have *an impact on its agreed strategic outcomes*, then it needs a realistic, practical, balanced and useful set of indicators to report against to the community and to the partners. This helps guide future planning and prioritisation.

The 2013 strategy highlighted the need and requirement for ongoing monitoring, “not just on actions but also on progress towards goals, emerging issues, challenges and perceptions within the community”.

A Report Card was produced as part of the SmartGrowth Update to monitor Strategy implementation between 2004 and 2012. As the 2013 Strategy pointed out, whilst this kind of information is useful in terms of identifying progress and lack of progress on implementing strategy actions, *it does not assist in measuring progress towards achieving the strategy vision and outcomes*.

The 2013 strategy noted that “it is difficult to measure progress made towards achieving the vision in the absence of agreed performance measures and monitoring indicators”. It said ongoing effort is required to develop indicators for measuring progress. The attached project report is responding to that strategic need for indicators. How can we measure the impact of actions in the strategy if we do not monitor progress towards what we want to achieve?

SmartGrowth’s Strategic Advisor, Ken Tremaine, points out that “one of the technically weakest areas in strategic thinking and planning is gathering the evidence to monitor outcomes. One can see why it’s easy to consign to the ‘too hard’ basket”.

Actions in implementation plan

The SmartGrowth Partnership Office is now co-ordinating a detailed bi-monthly report on implementation of strategy actions and forum activities. The independent chair of SmartGrowth is also producing a bi-monthly chair’s report.

This should enable oversight of strategy action implementation and performance by SmartGrowth leadership, chief executives and senior managers. A succinct report on Priority Actions in the 2013 Strategy and key actions in the past year is also being prepared alongside the draft monitoring indicator framework.

Are we making progress towards the vision and outcomes?

In terms of tracking progress towards the vision and outcomes in the SmartGrowth Strategy (see attached report), a partnership group of staff has been working with Carole Canler of Canler Consulting to develop a set of draft indicators to measure progress.

The aim is to have a monitoring framework in place that we report on regularly to track progress towards the outcomes the Partnership is seeking. These agreed 2013 outcomes are what the Partnership wants to impact on by implementing the strategy.

This monitoring framework can help flag challenges in achieving outcomes, and then assist governance and staff to track why actions are not having an impact, and if, and how, they need review and or a refresh. It will help prioritise those areas of the strategy's implementation plan that need a focus or priority push, and ensure effective and efficient use of resources across the partnership, and across the western Bay.

The key requirement in the monitoring indicators is that each must meet the agreed criteria, set out and agreed by the joint project group (see page 13 of attached report).

The SmartGrowth Partnership Office would like to acknowledge the work of all those involved in the working group from across the partnership including the District Health Board. We would especially like to thank the Bay of Plenty Regional Council, James Low and other regional council staff. The regional council has been a vital support in progressing the indicator work to this stage.

Attachment 1: Progress Report Indicator Framework report

DEVELOPING SMARTGROWTH PROGRESS REPORT

4 May 2017

To: Strategic Leadership Group

From: Carole Canler, Canler Consulting

Purpose of this paper

This paper provides the scope of SmartGrowth monitoring and reporting programme, and progress towards the development of an indicators framework for Smart Future. It seeks your feedback.

It is organised as follow:

- scope of SmartGrowth monitoring and reporting programme
- Smart Future - working group and other input
- Smart Future - criteria to select indicators
- Smart Future - final draft indicator framework
- Next steps.

Scope of SmartGrowth monitoring and reporting programme

“Regular performance monitoring and reporting” is a SmartGrowth priority action. Monitoring and reporting are effective tools to improve the way SmartGrowth does business and to track whether SmartGrowth is making progress towards desired outcomes.

The SmartGrowth Office wishes to follow good practice and to establish an on-going monitoring and reporting programme. It has appointed Canler Consulting.

The proposed monitoring and reporting programme contains three elements:

- 1- **Smart Actions** A succinct report on key actions over the previous year(s)
- 2- **Smart Future** A indicator report tracking progress against SmartGrowth outcomes (described on page 17 of the Strategy)

A third area of focus is taking the health of the partnership through a series of interviews and focus groups – **Smart Partnership**. This will be conducted in September 2017.

The first two elements will be reported as part of a progress report to be published later in the year for a general audience.

The table below explains the monitoring and reporting programme in more details.

The key audience is the partners rather the wider community.

SmartGrowth provides the glue to otherwise disparate parties and work programmes.

Smart Future - working group and other inputs

The development of the draft Smart Future monitoring framework was achieved through desk research and collaborative work with a working group comprising Ayy Greenway at TCC, Philip Martelli and Antoinette Denton at WBPDC, James Low at BoPRC, and Sarah Davies at DHB.

In addition, inputs were thought from other officials and various other organisations (e.g. NZTA, PriorityOne, Acorn Foundation).

The author would like to thank their invaluable input. A special thank to James Low and the staff at the regional council for guiding the selection, providing the data for a significant number of indicators.

Smart Future - Criteria for selecting indicators

Applying criteria to selecting indicators help to produce a manageable and balanced set of indicators from the large volume of indicators available. Criteria are described below.

Relevant to outcome of interest	Indicators measure outcomes and impacts ¹ , not activities. The framework and its indicators are organised around strategy's vision of "Western Bay of Plenty: a great place to Live, Learn, Work and Play" and relates to the areas of focus presented on page 17 of the Strategy
Reliable	The framework provides an overview picture of Western Bay that forms a reliable piece of information and communication with the wider community as well as elected members. Indicators may present hard data or perception surveys results. Sources are reliable and definitions and methods are presented for each indicator, as well as a link to further information when warranted.
SMART	Indicators are SMART – Simple, Measurable, Achievable, Realistic and Timely
Easy to interpret and understand	Indicators pass the 'people's test': i.e. are they of interest to the general public and can they easily be understood by the general public?
Geographically relevant	Ideally, indicators span both Tauranga and the Western Bay of Plenty area
Cost effective	Data is either free or cost effective to acquire, and readily available
Consistent over time	Past trends can be tracked: ideally, data is available for the last 10 years. Longer trends might be shown for environmental indicators if available. Collection methods or statistical methodology is unlikely to change in the foreseeable future.

¹ Final outcomes (the desired long-term impacts) and Intermediate outcomes (what near-term outcomes can be used to measure progress towards final Outcomes) - reflecting the expected causal chain between outputs and outcomes. Note that intermediate indicators are only required where the final outcomes are difficult to measure in a timely fashion.

Smart Future – Overview of the draft indicator framework

The table below presents the list of indicators selected for each desired outcome. Details for each indicator (such as source, frequency, reference to further information) are provided in Appendix.

Interest area :	Recognise tangata whenua cultural identity and change
Desired outcome:	We realise economic and social opportunities for tangata whenua while protecting cultural identity
Indicators:	<p>ADD CASE STUDY</p> <ol style="list-style-type: none"> 1. Tangata Whenua wellbeing: Whanau well being 2. Retain cultural identity: Maori language spoken 3. Maori educational attainment: School leavers with higher qualifications NCEA level 2 or higher
Interest area :	Integrated planning and the settlement patterns
Desired outcome:	We all work from the same long-term planning blueprint which incorporates planning for land use, transport and other infrastructure in an efficient and affordable way
Indicators:	<p>ADD CASE STUDY</p> <ol style="list-style-type: none"> 4. Population growth: Change in the number of residents 5. Sustainability: Use of transport mode other than private cars to work 6. Indication of quality of settlement patterns: Access to a park or reserve in urban areas <p>Note – this monitoring is in addition to the annual SmartGrowth Development Trends Report and the new National Policy Statement for Urban Development Capacity monitoring that is now required to ensure responsive planning.</p>
Interest area :	Strengthen visionary leadership and collaboration
Desired outcome:	We have visionary, collaborative leadership, a strong partnership and provide effective advocacy
Indicators:	No indicator - this interest area will be the focus of partners' interviews and focus groups as part of Smart Partnership
Interest area :	Sustain and improve the environment
Desired outcome:	We work together to protect and enhance our distinctive natural environment
Indicators:	<ol style="list-style-type: none"> 7. Bathing water quality in river: Percentage of rivers that are safe for swimming 95% of the time (NOTE small sample) 8. Bathing water quality in sea: Percentage of marine / coastal sites that are safe for swimming 95% of the time (NOTE small sample) 9. Harbour health: PLACE HOLDER single index in development by BoPRC 10. Air quality: Percentage of urban sites that have good air quality 11. Ecological protection: Percentage of waterway fenced for water quality protection
Interest area :	Build the community
Desired outcome:	We work proactively and in partnership with the community to make western Bay active, vibrant, connected, caring, healthy and safe
Indicators:	<ol style="list-style-type: none"> 12. Accessibility to public transport: Percentage of the population with access to public transport 13. Community connectedness: Participation in volunteering 14. Active lifestyle: Active participation rate of the population

15. Community health: Life expectancy at birth
16. Community health: Childhood obesity rate
17. Change in ageing population: Change in number of people over 65
18. Indicator of future educational attainment: Prior participation in early childhood education of children starting school
19. Safe communities: Safety perception (in your area)

Interest area :	Grow a sustainable economy
Desired outcome:	Our economy is thriving, growing, diverse and sustainable
Indicators:	<ol style="list-style-type: none"> 20. Job creation: Change in number of filled jobs created 21. Moving to the new economy: Proportion of knowledge intensive jobs 22. Economic growth: GDP growth 23. Enterprise creation: Change in number of business units 24. Educational attainment: School leavers with higher qualifications NCEA level 2 or higher 25. Earning level: Mean annual earning 26. Standard of living: Housing affordability (Note: New measures of housing and rent affordability have just been released by the Ministry for Business, Innovation and Employment and will be studied for their use in this framework if appropriate.) 27. City centre vibrancy: Number of visitors to city central cultural facilities (proxy) 28. Impact of urban development on rural production: Number of hectares of highly productive soil lost to development

Next Steps

The working group will finalise the indicator framework following your feedback. Upon finalisation of the indicator framework, each indicator will be populated and reported in a progress report developed in collaboration with the SmartGrowth Office.

Reporting against priority actions is currently being drafted.

A final progress report will be brought to SLG in August, Estimated publication time is September 2017.

Smart Partnership interviews and focus groups will take place in September 2017.

APPENDIX: DETAILS OF SMART FUTURE DRAFT INDICATOR FRAMEWORK

Interest areas	Indicator	Concept	Geographical coverage	Cost REMOVED	Source and notes	Frequency	Finding more (additional information to be provided in the progress report)
Interest area : Strengthen visionary leadership and collaboration	No indicator - this interest area will be the focus of partners' interviews and workshop under the Smart Partnership banner						
Interest area : Sustain and improve the environment	Percentage of rivers that are safe for swimming 95% of the time (during swimming season only)	Bathing water quality in river	Sub-region	Free	Note safe for swimming monitors E.coli levels and is different from NPS limits BoPRC monitoring data	Annual (back to 2003)	Message on water safety
	Percentage of marine / coastal sites that are safe for swimming 95% of the time (during swimming season only)	Bathing water quality in sea	Sub-region	Free	BoPRC monitoring data Note monitoring sites may vary slightly across years Note safe for swimming monitors E.coli levels and is different from NPS limits	Annual (back to 2003)	Refer to work on environ. monitoring by Regional Council
	<i>PLACE HOLDER: Health of the harbour</i>	<i>Harbour health</i>			<i>Note that Regional Council is considering the feasibility of reporting a single indicator / index for the health of the harbour. If available, this would be very useful for this framework</i>		
	Percentage of urban sites that are not polluted	Air quality			BoPRC monitoring data Note air quality is not currently an big issue for the sub-region but an important consideration for environmental health		Help the environment (message on rural fires)

Interest areas	Indicator	Concept	Geographical coverage	Cost REMOVE	Source and notes	Frequency	Finding more (additional information to be provided in the progress report)
					No action linked as no current issue with air quality in the urban areas		
	Percentage of waterway fenced for water quality protection	Ecological protection			BoPRC – Fencing tracking still evolving		Profile of the rural sector
Interest area : Build the community	Access to Public Transport	Accessibility to public transport	Sub-regional		BoPRC		Transportation Blue Print
	Participation in volunteering	Social capital – Community connectedness	Sub-regional		Acorn Foundation – annual survey on “How frequently have you volunteered your time in the past year?” Note no trends data		The role of the Acorn Foundation
	Active participation rate	Active lifestyle	Whole of Bay of Plenty		Active NZ Survey https://www.srknowledge.org.nz/wp-content/uploads/2016/02/2013-14-Regional-Profile-Bay-of-Plenty-FINAL.pdf	Every six years 2007/08 – 2013/14	How to join
	Life expectancy at birth	Community health	Sub-region		Statistics NZ	Yearly	Check equity across ethnicities
	Childhood obesity	Community health	Sub-region		DHB (either at age 4 or for age 10/12)	Goes back 3 or 4 years – annual data	Find out more
	Change in number of people over 65 living	Ageing population	Sub-region		Statistics NZ – Census of Population	Every five years	DHB aged care policy
	Prior participation in early childhood	Indicator of future	Sub-regional		MOE Education Counts	Annual 2010-2016	

Interest areas	Indicator	Concept	Geographical coverage	Cost REM OVE	Source and notes	Frequency	Finding more (additional information to be provided in the progress report)
	education of children starting school	educational attainment			Note: this indicator is linked to social and educational achievement later in life	Use March data	
	Safety perception (in your area)	Safe communities	Sub-regional	Free	TA residents survey (Note - Western Bay and TCC are aligning their safety question from 2018 – data available from next year – in the meantime use Acorn Foundation)	Annual (no historic data)	
Interest area : Grow sustainable economy	Number of filled jobs created	Job creation	Sub-regional	Free	Infometrics commissioned by PriorityOne	Annual back to 2001	Key industry sectors for job creation
	Knowledge intensive jobs	Moving to the new economy	Sub-regional		Infometrics commissioned by PriorityOne	Annual back to 2001	Innovation project by P1
	GDP growth	Economic growth	Sub-regional		Infometrics commissioned by PriorityOne	Annual back to 2001	Compared to NZ
	Number of business units	Enterprise creation	Sub-regional	Free	Infometrics commissioned by PriorityOne	Annual back to 2001	AN example of a start up
	School leavers with higher qualifications NCEA level 2 or higher	Educational attainment	Sub-regional		MOE WWW.educationcounts.govt.nz Next results in August 2017	Annual Latest: 2015	
	Mean annual earning	Standard of living	Sub-regional		Infometrics commissioned by PriorityOne	Annual back to 2001	Population with low incomes
	Housing affordability	Standard of living	Sub-regional		Infometrics	Annual back to 2001	No of people on social housing

Interest areas	Indicator	Concept	Geographical coverage	Cost REMOVE	Source and notes	Frequency	Finding more (additional information to be provided in the progress report)
							register per head of population
	Number of visitors to city central cultural facilities (as a proxy to show changes in visitation to city centre)	City centre vibrancy	Sub-region		TCC Heart of the City Programme monitoring Total number of visitors to Baycourt, Arts Gallery and Central Library	Annual	Te Awanui project (museum project)
	Number of hectares of highly productive soil lost to development	Impact on urban development	Sub-regional		BopPRC Highly productive soil = LR1 soil classes 1,2 and 3	Annual	Kiwi industry Or food sensitive planning
Interest area : Recognise tangata whenua cultural identity and change	Whanau well being	Tangata Whenua well being	Iwi		Statistics NZ Census of Population: Te Kupenga Te Kupenga is NZ's first survey of Māori well-being and collects information on a wide range of topics to give an overall picture of the social, cultural, and economic well-being of Māori in New Zealand.	Every five years	Whanau Papakainga
	Maori educational attainment: School leavers with higher qualifications NCEA level 2 or higher	Educational attainment	Sub-regional		MOE WWW.educationcounts.govt.nz Next results in August 2017	Annual Latest: 2015	Proportion of Maori amongst population under 25

Interest areas	Indicator	Concept	Geographical coverage	Cost REM OVE	Source and notes	Frequency	Finding more (additional information to be provided in the progress report)
ADD CASE STUDY	Maori language spoken	Retain cultural identity	Sub-region		Statistics NZ Census of Population	Every five years	Where to learn
Interest area : Integrated planning and the settlement pattern ADD CASE STUDY	Change in the number of residents	Population growth	Sub-regional		SmartGrowth	Annual estimates plus census data	Ageing population
	Use of transport mode other than private cars to work	Sustainability	Sub-regional		BoPRC	Census and bus patronage	Level of travel (vehicle km travelled per person) + cost of travel + purpose of travel
	Access to a park or reserve in urban areas	One indication of quality of settlement patterns	Urban areas		BoPRC	Annual	Compact city project Refer to development trend report



Working Paper

Population-weighted densities in New Zealand and Australian cities: A new comparative dataset

MRCagney Working Paper

Prepared by: Peter Nunns (Senior Economist)

MRCagney Pty Ltd

14 September 2014

Document Information

Project Name	Population-weighted densities in New Zealand and Australian cities: A new comparative dataset
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1 Overview of findings

In this paper, we present a new comparative dataset of population density in New Zealand and Australian cities. We define a new, more robust measure of density – population-weighted density – and produce estimates for all major urban areas in both countries. We present the results in map format in this report and in interactive comparison charts available in an associated spreadsheet.

This dataset will be relevant to transport planners, urban planners, researchers, and anybody with an interest in the fortunes of New Zealand and Australian cities.

1.1 Introducing a new population-weighted density measure

There are several ways to measure population density. The most common approach, used in Demographia (2014) World Urban Areas report and a number of other publications, is to estimate average density by dividing a city's total population by its total land area. Essentially, this simply measures the number of people living in the average hectare of land in the city. Although it is straightforward to calculate, it can significantly underestimate the density of large cities that include both high-density inner city areas and low-density suburbs.

We introduce an alternative measure, population-weighted density, which provides a more meaningful picture of variations between cities. This measure reflects the density of the neighbourhood in which the city's average resident lives. We use detailed geographic data from the 2001, 2006 and 2013 New Zealand Census and the 2011 Australian Census to calculate population-weighted density for all major urban areas in each country.

1.2 Key findings on urban population density

Visualising and comparing population density in New Zealand and Australian cities leads to some interesting insights about urban form and transport systems.

1.2.1 Choice of measures matter

Alternative measures of population density can produce very different results. For large cities, population-weighted density tends to be significantly higher than simple average density. This reflects the fact that large cities tend to include areas with a wide range of densities. As a result, a population-weighted density measure most accurately reflects the lived experience of a city's average residents.

1.2.2 Larger cities also tend to be denser

The densest cities in Australasia are also among the largest cities – which should come as no surprise as space is at a premium in larger cities.

As expected, Australia's two largest cities, Sydney and Melbourne, are also the densest cities in Australasia. These cities have high-density cores and substantial surrounding areas with medium-high population density, supported by extensive rail infrastructure. However, they also have large, low-density suburban areas on the urban fringes.

However, Auckland is also surprisingly dense – a finding that contradicts its reputation as a low-density city. After a decade of intensification and infill development, Auckland has become the third-densest city in Australasia – significantly exceeding comparably sized Australian cities such as Perth and Brisbane. Auckland is in a good position to benefit from these changes by expanding and improving public transport services and building new rapid transit infrastructure such as the City Rail Link and the AMETI busway.

1.2.3 Population density has changed rapidly in some New Zealand cities

Between the 2001 and 2013 Census, some New Zealand cities experienced rapid changes in population density.

In particular, Auckland appears to be in the midst of a remarkable period of transformation, with population-weighted density rose by one-third from 32.4 people/ha to 43.1 people/ha. Wellington and Dunedin also experienced significant increases in density – and there is some evidence that Hamilton may become increasingly dense as it grows.

However, most medium and small cities have relatively low population-weighted densities of between 18 and 25 people per hectare and are experiencing relatively little change in density. Some of these cities are growing strongly (Hamilton, Tauranga), but most are growing slowly (Invercargill, Rotorua, Gisborne) or declining in population (Whanganui).

Christchurch appears to be a special case due to the impact of the 2011 Canterbury Earthquake. It experienced modest population growth and a small increase in population-weighted density from 2001 to 2006, but the 2011 Canterbury Earthquake appears to have reversed its population growth and reduced its density.

1.2.4 Population density profiles show a “missing middle” in many large cities

We observe a consistent spatial pattern in a number of large Australian and New Zealand cities. In Melbourne, Brisbane, Perth, Adelaide, Canberra, Auckland, and Wellington, density is high in city centres but falls off rapidly in the surrounding suburbs. Compared with large cities in Europe or Asia, or Sydney for that matter, these cities seem to have a “missing middle” of medium-high density suburbs.

2 Measuring (and mismeasuring) urban density

2.1 Why should we care about population density?

Cities are physical expressions of the economic advantages of proximity. They form as a result of and are shaped by agglomeration economies – the improved access to labour markets, supply chains, knowledge spillovers, and amenities that people enjoy when they cluster together. Population density is an essential feature of urban life. Even in sprawling American metropolises such as Houston or Atlanta, people live at densities fifty or a hundred times greater than in rural areas.

Population densities vary greatly within cities and between cities. It is important to understand these variations as they can have important implications for cities' liveability, economies, and public policy. For example, population density can influence:

- The efficiency of infrastructure provision and public transport services
- Urban productivity and levels of competition in industries like retail
- Amenity for residents – higher density can support cultural institutions and local vibrancy, but some people may prefer more open space
- Preservation of open space and agricultural land on the urban fringes
- Cities' energy efficiency and use of resources.

As a result, comparative measures of urban population density can help to shed some light on the economic, social, and environmental prospects for cities. But before conducting such an analysis, we must ask: What is population density?

2.2 Traditional measures of density can be misleading

The most common way to measure density is to simply divide the number of people living within a city by the city's total land area. For example, the widely cited Demographia World Urban Areas (2014) dataset uses this measure, in spite of its limitations.

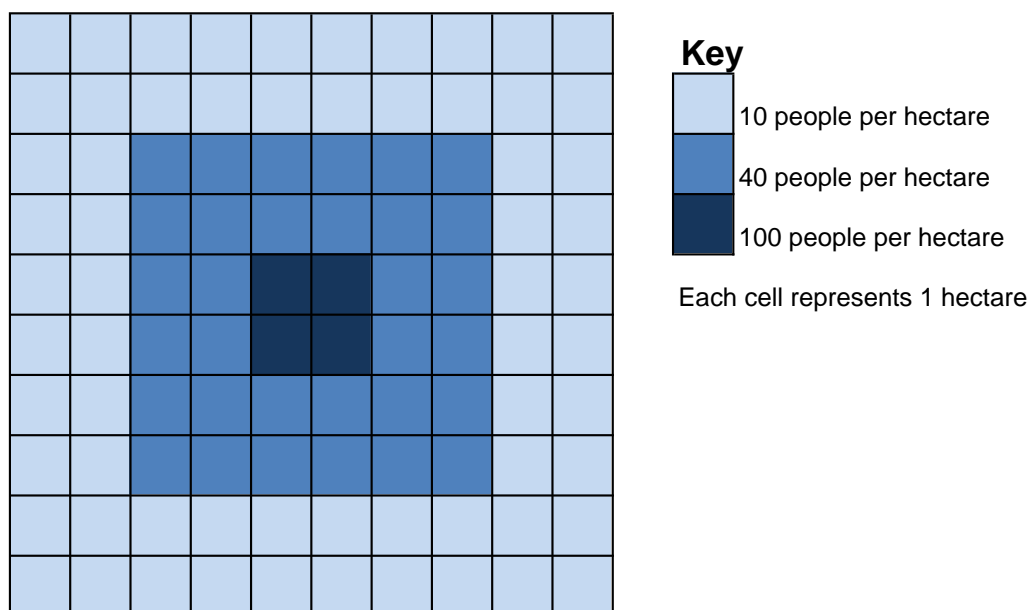
A simple measure of average density can produce misleading results, as density is seldom homogenous within urban areas. Large cities tend to have a mix of densities – which should come as no surprise as their residents have a range of different preferences, occupations, and incomes. To illustrate how average density measures can be misleading, Table 1 presents Demographia's estimates for New York and Los Angeles. They suggest that Los Angeles is actually 33% denser than New York – a finding that would surprise most New Yorkers (and Angelenos for that matter). But it's not unexpected – although the vast majority of New Yorkers live in high-density places such as Manhattan and Brooklyn, the urbanised area also extends into low-density Long Island suburbs and large regional parks. In Los Angeles, by contrast, decades of low-density infill development mean that the region is fairly continuously developed.

Table 1: Demographia's 2014 population density estimates for two major American cities

Urban area	Total population	Total land area (km ²)	Average density
New York (NY-NJ-CT)	20.66 million	11,642 km ²	1,800 people/km ²
Los Angeles (CA)	15.25 million	6,299 km ²	2,400 people/km ²

Figure 1 illustrates some of the pitfalls involved in measuring density in urban areas. It presents a fairly typical urban structure, which has a small high-density area near the middle (shown in the dark blue cells) followed by a ring of medium-density suburbs and, finally, a low-density exurban fringe (light blue cells).

Figure 1: Comparing density measures in a hypothetical city



Most of the land area in this hypothetical city is occupied at a relatively low density – out of the 100 hectares of land area in this city, 64 hectares have a population density of 10 people per hectare. However, the majority of the city's population lives in medium-density and high-density areas of the city.

The following table summarises the distribution of population in the different areas. As it shows, the city's populated by a total of 2,320 people. The city's simple average population density (total population divided by total land area) is therefore equal to 23 people per hectare.

However, this figure is quite misleading, as it doesn't give a good idea of the density that the city's average resident is living at. Table 2 shows that the average resident lives at a much higher density. 1,280 of the city's residents live in the medium-density areas, while another 400 live in the high-density areas.

If we calculate density on a population-weighted basis, rather than weighting it by land area, we get an estimate of 42 people per hectare. This population-weighted density measure is much more representative of average outcomes for the city's residents.

Table 2: Distribution of total urban population in a hypothetical city

Density (pop/ha)	Total hectares	Total people
10	64	640
40	32	1280
100	4	400
Total	100	2320

As we will see, this hypothetical example is fairly close to observed outcomes in large cities. Population-weighted density measures are significantly higher than simple average density for most large cities in Australia and New

Zealand, including Sydney, Melbourne, Brisbane, Auckland, and Wellington. However, the two measures are relatively similar for smaller cities such as Hamilton, Tauranga, and Hobart.

2.3 Introducing a new population-weighted density measure

With that example in mind, how should we go about measuring population density?

The most common approach to measuring population density is simply to divide the total population of a city by the total land area of the city. As shown above, this approach will tend to underestimate the density of cities with large expanses of lightly populated exurban land. However, this approach is commonly used for international comparisons due to the fact that it is relatively straightforward to calculate¹.

Equation 1 shows how this simple measure of average population density is calculated.

Equation 1: Calculating the average density of a city

$$\text{Average density} = \frac{\sum_i^N P_i}{\sum_i^N A_i}$$

where P_i = population of area i ; A_i = land area of area i ; and areas in city are enumerated $i=1,2,\dots,N$.

The population-weighted density measure was introduced by Barnes (2001) to correct for the weaknesses of the simple average density measure. This measure was recently used by the US Census Bureau to produce consistent and meaningful data on American cities (Wilson et al, 2012). As the example above suggests, it more accurately reflects the density at which the average city resident is living (Eidlin, 2010).

Population-weighted density is estimated by calculating the density of all individual neighbourhoods within a city, assigning each neighbourhood a weight equal to its share of the city's total population, and summing up the weighted density of all neighbourhoods. In other words, if a dense inner-city neighbourhood has ten times as many people as an outlying suburban neighbourhood, the inner-city area would be weighted ten times as heavily as the suburban area.

Equation 2 shows how a population-weighted density measure can be estimated for a city. When calculating this measure, it is important to note that the results may be influenced by the size of the areas i which are used for analysis. For example, an analysis conducted at the level of individual neighbourhoods (~500 dwellings) may result in different results than an analysis conducted at the level of individual suburbs (~5,000 dwellings). Generally speaking, using larger areas will result in a lower density estimate, as they are more likely to include parks, business zones, and other non-residential areas.

Equation 2: Calculating the population-weighted density of a city

$$\text{Population-weighted density} = \sum_i^N \frac{P_i}{A_i} * \frac{P_i}{\sum_j^N P_j}$$

where P_i = population of area i ; A_i = land area of area i ; and areas in city are enumerated $i=1,2,\dots,N$.

¹ However, it is still possible to miscalculate density. One common mistake is to use the wrong urban boundaries. For example, some analysis of US cities uses administrative boundaries rather than total urbanised areas – effectively, drawing too tight a line around the city. Another common mistake is to

2.4 Estimating population-weighted densities for New Zealand and Australian cities

We use the method defined above to develop consistent and comparable estimates of population-weighted densities for all major New Zealand and Australian cities. To our knowledge, this is the first attempt to produce comparable measures of population-weighted densities across both countries, although Charting Transport (2013) has produced estimates for Australian cities.

In order to estimate population-weighted densities, we have used Census data on usually resident population at the meshblock, or neighbourhood, level². New Zealand Census data was available at this level for 2001, 2006, and 2013 (Statistics NZ 2013), while Australian Census data was readily available only for the 2011 (ABS 2011). We used GIS mapping tools to estimate the total land area (in hectares) and centre-point of each meshblock, and publicly available GIS databases of road and rail networks to provide context about the relationship between infrastructure and population density³.

We report estimates of population density for 15 New Zealand Metropolitan Urban Areas (MUAs)⁴ and 15 Australian Significant Urban Areas (SUAs)⁵. These areas differ from administrative boundaries – for example, the Wellington MUA covers Wellington City as well as the Hutt Valley and Porirua, as these local authorities form a contiguous developed area. We have excluded areas with population densities less than 3 people per hectare, as these are more likely to be rural areas or lifestyle blocks than urbanised areas⁶.

² We found that it was necessary to conduct analysis at the meshblock level as higher levels of aggregation – area units (AU) in New Zealand, statistical area level 1 (SA1) or statistical area level 2 (SA2) in Australia – differed widely in size. Meshblocks are broadly comparable in size between both countries.

³ The New Zealand databases on road and rail infrastructure show state highways (motorways) and both freight and passenger rail lines. By contrast, the Australian road infrastructure database includes all nationally important roads, whether or not they are motorways, while the Australian rail infrastructure database excludes underground passenger rail lines such as the Melbourne City Loop.

⁴ In order of population size, New Zealand cities are Auckland, Wellington, Christchurch, Hamilton, Napier-Hastings, Tauranga, Dunedin, Palmerston North, Nelson, Rotorua, New Plymouth, Whangarei, Invercargill, Whanganui, and Gisborne. In the case of Auckland, Wellington, and Christchurch we have also included outlying satellite towns such as Pukekohe, Kapiti, and Rangiora which are also integrated into the urban economy.

⁵ In order of population size, Australia cities are Sydney, Melbourne, Brisbane, Perth, Adelaide, Gold Coast - Tweed Heads, Canberra - Queanbeyan, Newcastle - Maitland, Wollongong, Sunshine Coast, Hobart, Geelong, Townsville, Cairns, and Darwin.

⁶ This rule has resulted in the exclusion of some predominantly business-zoned areas, such as industrial parks and downtown areas with little residential activity. Sensitivity testing on the minimum population threshold shows that this does not bias the results significantly.

3 Visualising urban population density in New Zealand and Australia

Here, we present estimates of population density for major New Zealand and Australian cities. Full results are available in our interactive spreadsheet, which enables users to compare between cities and (for the New Zealand cities) graph changes in population density over time.

3.1 Comparing density in main cities

Table 3 presents summary data for New Zealand's three major cities and Australia's five largest cities. As discussed in the previous section, population-weighted densities are much greater than simple average density for most of these cities, suggesting that variations in density within built-up areas can be significant. A few key results:

- Broadly speaking, there seems to be a positive relationship between city size and population density⁷, suggesting that larger cities face stronger imperatives to use space more efficiently. Sydney and Melbourne are both the largest cities in Australasia and the densest.
- In spite of its reputation as a low-density city, Auckland is actually the third-densest city in Australasia – not far behind Melbourne. It is also significantly more compact than Australian cities of comparable size.
- Christchurch stands out as having relatively low population-weighted density – no surprise given the fact that it is smaller and less geographically constrained than other cities in this sample. However, Perth and Adelaide also have surprisingly low densities given their larger populations and extensive rail systems.

Table 3: Population-weighted densities in main New Zealand and Australian cities

Population-weighted densities in main cities*

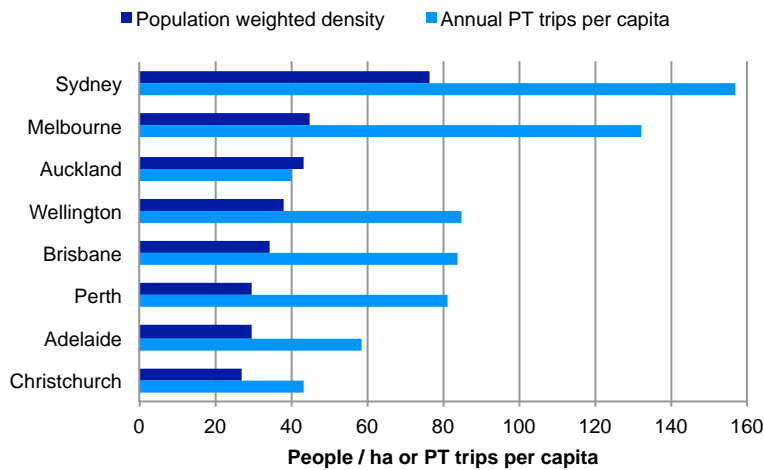
Year	City	Urban population (millions)	Urbanised area (ha)	Average density	Population-weighted density
2013	Auckland	1.31m	48,642	27.0	43.1
2013	Wellington	0.40m	18,864	21.3	37.8
2013	Christchurch	0.37m	16,967	21.6	26.9
2011	Sydney	3.93m	104,137	37.8	76.3
2011	Melbourne	3.76m	136,879	27.5	45.0
2011	Brisbane	1.87m	85,319	21.9	34.2
2011	Perth	1.62m	70,798	22.9	29.8
2011	Adelaide	1.17m	50,640	23.1	29.4

* Defined using urban boundaries, excluding areas with under 3 people per hectare

Comparative data suggests that population density isn't holding Auckland's public transport system back. Figure 2 compares population-weighted density and public transport patronage in main Australasian cities. It shows that Auckland underperforms on ridership per capita when compared with cities of similar or lower density. Better service planning and increased investment in Auckland's public transport network could easily deliver major gains in ridership, as Mees (2010) argues.

⁷ This relationship is statistically significant ($p < .01$) and suggests that a city that is ten times larger will, on average, have a population-weighted density that is 14.6 people per hectare higher.

Figure 2: Density and public transport patronage in major Australian and New Zealand cities

Spot the outlier: Population density and PT ridership**3.2 Mapping density in main cities**

In this section, we map population density in seven major cities in New Zealand and Australia and compare differences between cities and changes across time.

Figure 3 shows that Auckland is firmly a middle-density city. Population densities in neighbourhoods throughout the urbanised area are consistently in the 30-40 or 40-50 people per hectare ranges. Moreover, densities have increased throughout the city over the last decade, as developers have taken up the majority of the infill and subdivision opportunities within existing urban boundaries (MBIE 2013). However, it is significant that although the city centre's residential population has grown significantly (see Figure 9 below), intensification has not spilled over to the surrounding suburbs.

Figure 3: Mapping Auckland's population density, 2001-2013

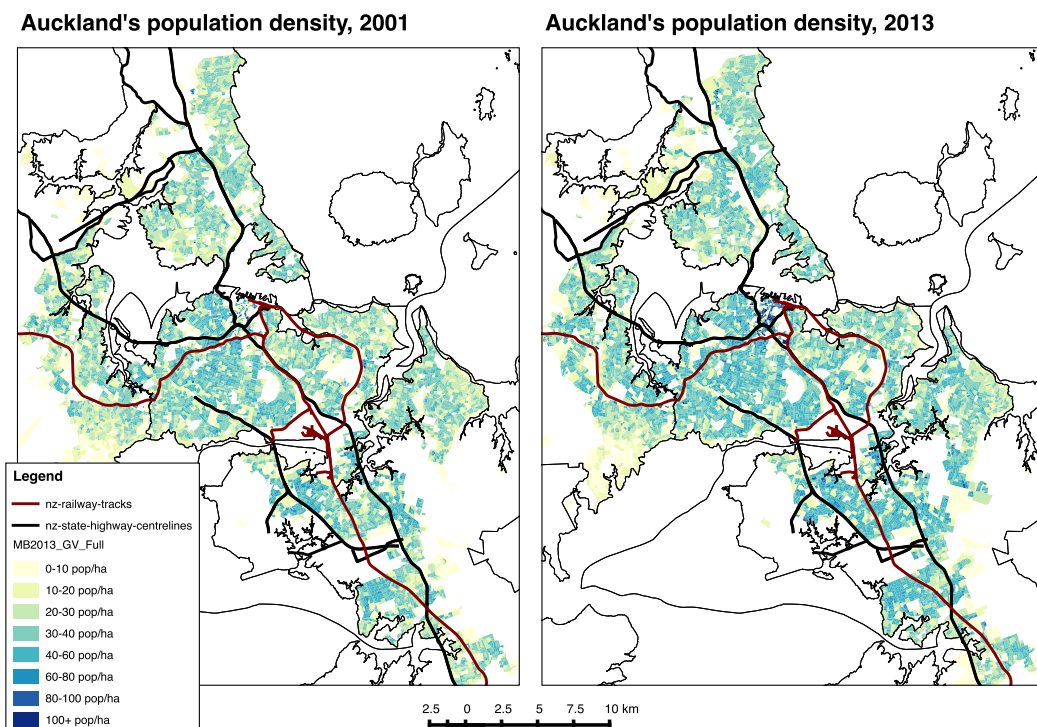


Figure 4 shows the influence of geography and infrastructure on Wellington's urban form. The city centre is constrained by harbours and hills and has relatively high population densities – over 100 people per hectare in some places. Densities have significantly increased in the centre over the last decade, reflecting the appeal of Wellington's downtown areas. However, Wellington is also connected to large low- to medium-density developments in the Hutt Valley and Porirua by rail lines. There have been few changes to density in these areas.

Figure 4: Mapping Wellington's population density, 2001-2013

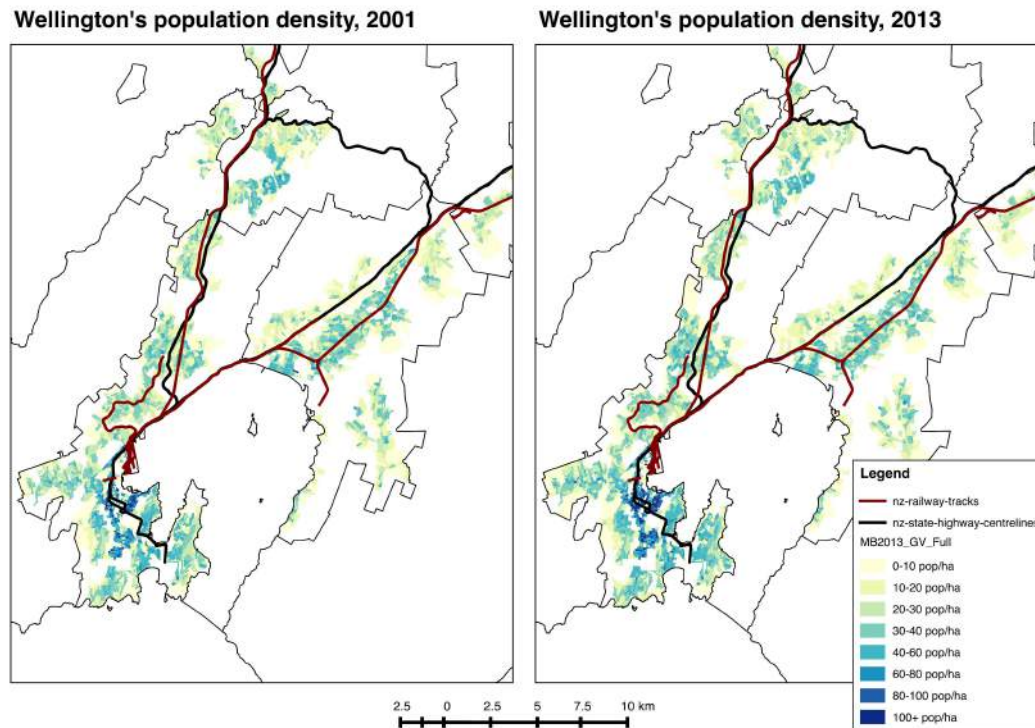


Figure 5 shows that Christchurch is composed almost entirely of low- to medium-density areas, with few areas that have more than 60 people per hectare. Unlike Auckland and Wellington, Christchurch has relatively few residents in its city centre, where population densities are below the 3 people per hectare threshold. However, it does show some signs of intensification in the city centre fringe.

The effects of the February 2011 Canterbury Earthquake are also apparent in Figure 5. Population densities have generally dropped in Christchurch's eastern suburbs as a result of the "red-zoning" of geologically unstable areas. Although it is not apparent in this map, satellite towns to the west and north of the city have grown considerably since the earthquakes.

Figure 5: Mapping Christchurch's population density, 2001-2013

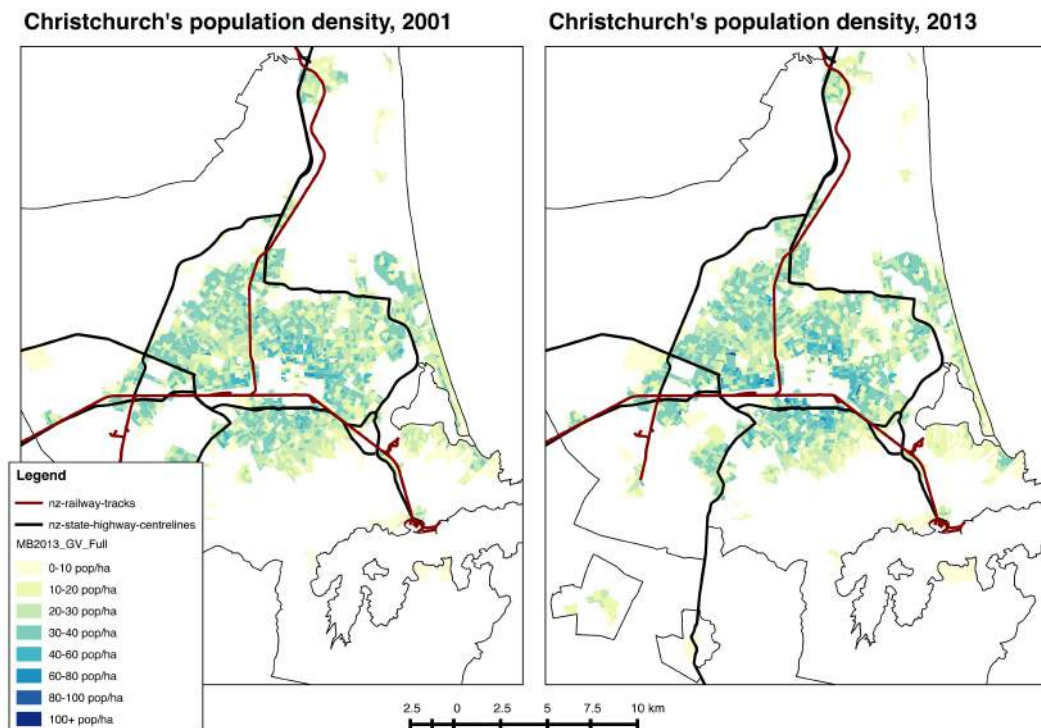
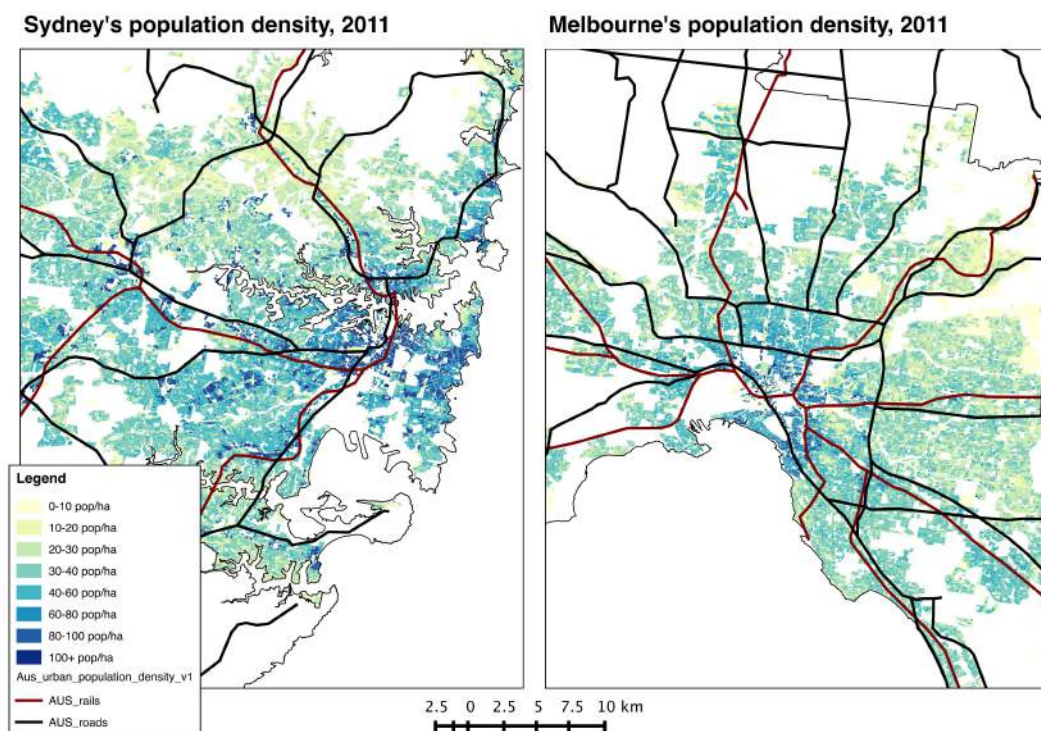


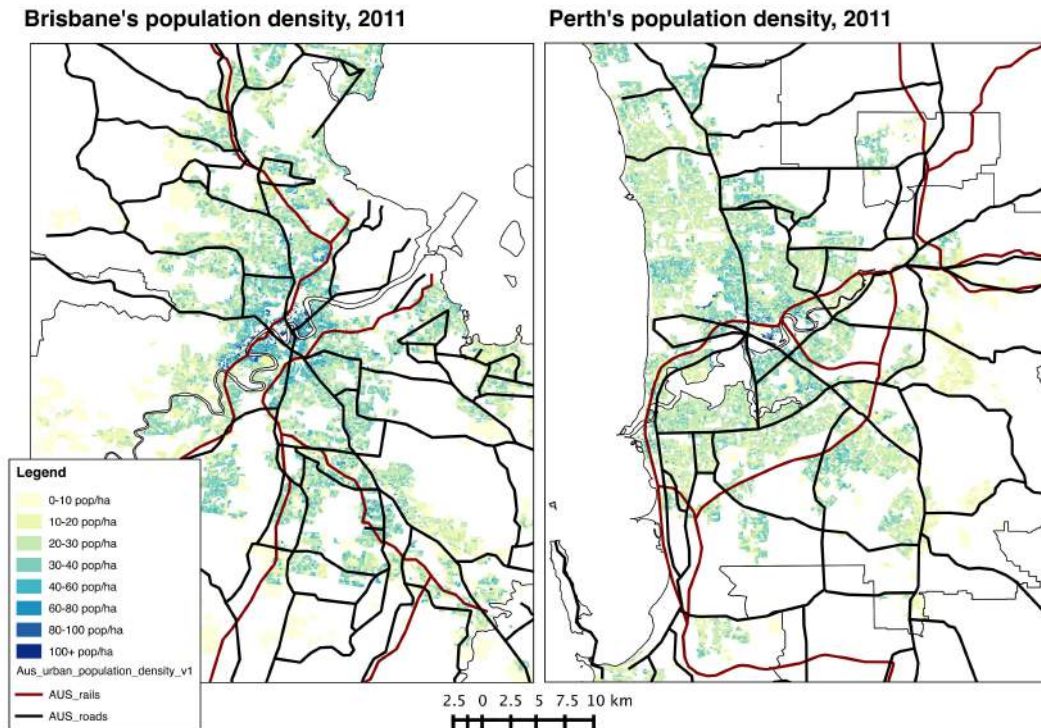
Figure 6 presents population densities in Australasia's largest cities, Sydney and Melbourne. Both cities are more extensive than the New Zealand cities, and, unlike Auckland and Wellington, they contain significant high-density residential areas outside of the city centre. Sydney is especially dense – many areas of the city have population densities above 80 people per hectare, especially near the city centre and along the eastern coast. In Melbourne, densities are higher near the city centre and in the inner-city areas served by abundant public transport. However, both cities also have extensive fringe areas with low population densities.

Figure 6: Mapping population density in Sydney and Melbourne, 2011



Finally, Figure 7 shows population densities in Brisbane and Perth, two Australian cities that are comparable in size to Auckland. These cities include some high-density areas in the centre along with a sprawling, low- to medium-density periphery aligned with rail lines and motorways.

Figure 7: Mapping population density in Brisbane and Perth, 2011



3.3 Comparing Perth and Auckland

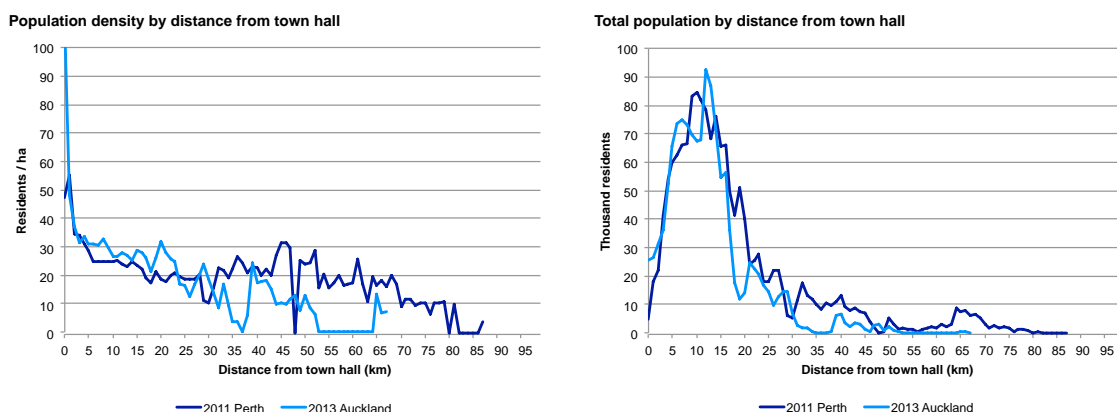
Perth has often been cited as an example for Auckland as it has successfully modernised and expanded its rail network over the past two decades. As a result, it is instructive to compare the distribution of population within both cities. Our interactive spreadsheet allows users to graph population data for all thirty cities in our dataset – here, we use it to present results for these two cities.

Figure 8 compares the population density profiles and distribution of population in Perth and Auckland as a function of straight-line distance from town hall. The graph on the right shows that most residents of both cities live within 25 kilometres of town hall. However, Perth has some outlying satellite towns as far as 60-80 kilometres away. The graph on the left compares population density profiles, showing that Auckland has a denser city centre and also slightly higher densities within the inner suburbs.

Interestingly, density is high in both city centres but falls off rapidly in the surrounding suburbs. As it turns out, this is a common pattern in a number of large Australian and New Zealand cities – Melbourne, Brisbane, Adelaide, Canberra, and Wellington are all strikingly similar. In terms of population density, there seems to be a “missing middle” in both countries.

This analysis suggests two important things about rail (and other rapid transit systems). First, high density is not a prerequisite for having an efficient and popular train system. Perth’s rail system now has over 60 million annual rail boardings. Second, rail may actually enable relatively low-density development by providing residents of outlying suburbs with a relatively rapid and congestion-free transport option.

Figure 8: Population density and distribution of population in Perth and Auckland



3.4 A decade of change in (some) New Zealand cities

Estimates of population-weighted density suggest that different cities have experienced very different outcomes between the 2001 and 2013 Census. In particular, Auckland appears to be in the midst of a remarkable period of transformation, with population-weighted density rose by one-third from 32.4 people/ha to 43.1 people/ha. Table 4 summarises data on New Zealand's 15 urban areas over this time period. It suggests that these cities can be divided into two broad categories:

- Large cities which have experienced significant increases in density, including Auckland, Wellington, and, to a lesser extent, Dunedin. The pace of change has been most rapid in Auckland. There is also some evidence that Hamilton may be moving into this category as it grows.
- Medium and small cities which have relatively low population-weighted densities of between 18 and 25 people per hectare and which have experienced relatively little change in density. Some of these cities are growing strongly (Hamilton, Tauranga), but most are growing slowly (Invercargill, Rotorua, Gisborne) or declining in population (Whanganui).

Christchurch appears to be a special case. It experienced modest population growth and a small increase in population-weighted density from 2001 to 2006, but the 2011 Canterbury Earthquake appears to have reversed its population growth and reduced its density. It is not clear at this point whether this is a long-term trend or whether Christchurch will follow a similar trajectory to Auckland and Wellington after recovering from the earthquakes.

Table 4: Changes in population-weighted density in New Zealand cities, 2001-2013

Change in population-weighted density in New Zealand cities*

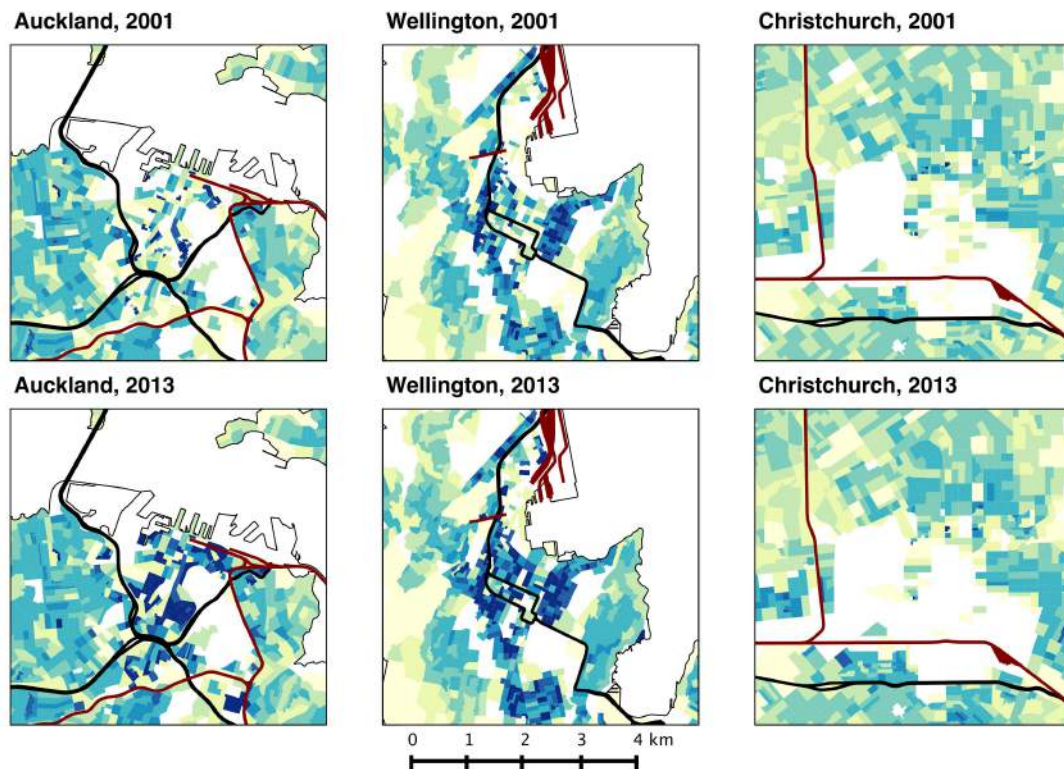
City	Population-weighted density in...			% change in density, 01-13
	2001	2006	2013	
Auckland	32.4	38.5	43.1	33%
Wellington	32.2	35.2	37.8	17%
Christchurch	26.1	27.1	26.9	3%
Hamilton	25.0	26.2	27.2	9%
Napier-Hastings	24.6	25.1	24.4	-1%
Tauranga	21.4	22.2	22.6	5%
Dunedin	28.1	32.4	31.9	14%
Palmerston North	25.0	24.8	25.0	0%
Nelson	22.8	22.5	23.2	2%
Rotorua	20.6	21.1	20.7	0%
New Plymouth	19.1	19.3	19.1	0%
Whangarei	18.6	19.2	18.0	-3%
Invercargill	19.5	19.5	19.5	0%
Whanganui	18.5	18.4	17.7	-4%
Gisborne	19.1	19.1	18.3	-4%

* Defined using urban boundaries, excluding areas with under 3 people per hectare

Figure 9 focuses more closely on changes in inner-city areas of Auckland, Wellington, and Christchurch. It shows that there have been significant increases in population density in the Auckland and Wellington city centres. However, there is also a remarkable lack of change in some popular and pricey suburbs. Although demand for high-density living appears to have spilled over from central Wellington to neighbouring suburbs, there have been few significant changes in density in Auckland's inner suburbs.

And, as expected, there have been few changes in the centre of Christchurch, where the economic decline of the city centre was followed by its demolition after the 2011 Canterbury Earthquake.

Figure 9: Changing population densities in inner-city areas in major New Zealand cities, 2001-2013



4 Discussion and conclusions

Compiling a comparative dataset on population density in New Zealand and Australian cities has allowed us to visualise patterns of population density and compare cities on both sides of the Tasman. Although this analysis is primarily descriptive in nature, it has led to some interesting insights:

- Different measures of population density can produce very different results. We find that a population-weighted density measure most accurately reflects the lived experience of a city's average residents.
- For large cities, population-weighted density tends to be significantly higher than simple average density. This reflects the fact that large cities tend to include areas with a wide range of densities.
- As expected, Australia's two largest cities, Sydney and Melbourne, are also the densest cities in Australasia.
- However, supposedly low-density Auckland is also surprisingly dense. After a decade of intensification and infill development, Auckland has become the third-densest city in Australasia – significantly exceeding comparably-sized Australian cities.
- Population densities are strongly increasing in Auckland and Wellington, particularly in city centres, but falling in Christchurch as a result of the dispersal of inner-city population after the Canterbury earthquakes.
- We observe a consistent spatial pattern in a number of large Australian and New Zealand cities. Density peaks in the centre and falls off very rapidly outside it.

4.1 Implications for transport

Population density has a significant impact on the efficiency of urban transport systems. Generally speaking, large medium-density cities are good candidates for efficient bus and rapid transit systems. High-quality, well-designed public transport networks offer a good alternative to traffic congestion. Estimates of population-weighted density suggest that most major Australasian cities can support efficient public transport networks (as argued by Mees, 2010).

Our findings suggest that Auckland is in an especially good position to benefit from a virtuous cycle in its transport system (Mees et al, 2010). Recent increases in density throughout the urbanised area have contributed to rising ridership on public transport, strengthening the case for further investment in projects like the City Rail Link, the AMETI busway, and the city's New Network. Successful public transport delivery can in turn encourage further land use change.

However, other New Zealand cities face different challenges. Christchurch, in particular, has struggled following the 2011 Canterbury Earthquake, which disrupted land use patterns in the city centre and eastern suburbs. However, the introduction of a new bus network based on high frequency connecting lines (a la Walker 2011) and the development of new cycle routes will create opportunities for the city.

Lastly, transport policy should take into account the direction of change in land uses. In large New Zealand and Australian cities, space is increasingly at a premium, as shown in high densities in city centres and (especially in Auckland) rising densities throughout the city. Policymakers should take spatial patterns of demand into account, looking for opportunities to benefit from virtuous cycles between efficient infrastructure provisions and increasing population density.

4.2 Implications for urban planning

Urban planning should take into account existing population densities and changes in population density. Land use policies can both impose costs and provide benefits in cities that are experiencing population change. Broadly speaking, policies should be flexible enough to cope with changes in housing demand.

Land use regulations can become increasingly binding as a result of changes in land values and population density. For example, MRCagney (2013) shows that minimum parking requirements (MPRs) are likely to have become more binding – and hence more costly – over time in Auckland. When MPRs were first imposed in the 1960s, land was relatively cheap and demand for parking was increasing rapidly. However, increasing intensity of land use and increasing land prices mean that they are now a sub-optimal policy.

Our urban population density dataset suggests that there have been some important changes over the last decade. Auckland in particular has experienced striking changes – population-weighted density rose by 33% between 2001 and 2013.

Many Australasian cities appear to be undergoing the “demographic inversion” described by Ehrenhalt (2012). Rapid increases in population density in Auckland and Wellington’s city centres are strong evidence of rising demand for urban living and proximity. However, changes in density in Auckland’s city centre fringe have been comparatively limited and focused on development of vacant sections and subdivision of residential lots rather than construction of new housing types.

Most large Australasian cities – Auckland, Wellington, Melbourne, Perth, Brisbane, Adelaide, and Canberra – exhibit a similar pattern of development. These cities have high population densities in the city centre, but densities fall off rapidly outside the centre. Compared with large cities in Europe or Asia, or Sydney for that matter, these cities seem to have a “missing middle” of medium-high density suburbs.

4.3 Areas for further research

Our comparative analysis of urban population density in New Zealand and Australian cities opens up avenues for further research. We identify three key areas where additional analysis is required:

- First, population density is only part of the picture, as employment density and the mix of uses in urban areas also has an important impact on urban outcomes and transport networks. Developing a similar dataset combining population and employment density would allow for a more nuanced analysis of density.
- Second, it is necessary to understand the determinants of land use change and changes in population density at a more detailed level. Previous research in this area has shown that land prices are influenced by urban transport investments (Grimes and Liang, 2010; Grimes and Young, 2010) and planning regulations (Grimes and Liang, 2007, Zheng, 2013). However, the effect on the development activity is less well understood. Consequently, one area for further analysis could be to use this dataset to explore the influence of factors such as land prices, employment accessibility, regulations, and local amenity on changes in density.
- Third, a range of research suggests that there is a relationship between population density and transport outcomes. For example, Nunns et al (2014) finds that household travel expenditure is higher in outlying suburbs in major New Zealand cities. Our urban population density dataset provides opportunities to examine a range of transport issues. For example, linking it with route-level data on public transport services will allow for a more detailed empirical examination of the relationship between density and public transport cost recovery, as undertaken by Guerra and Cervero (2012) for American cities.

We are currently involved in ongoing research projects in each of these areas – in short, stay posted!

APPENDIX A Additional maps

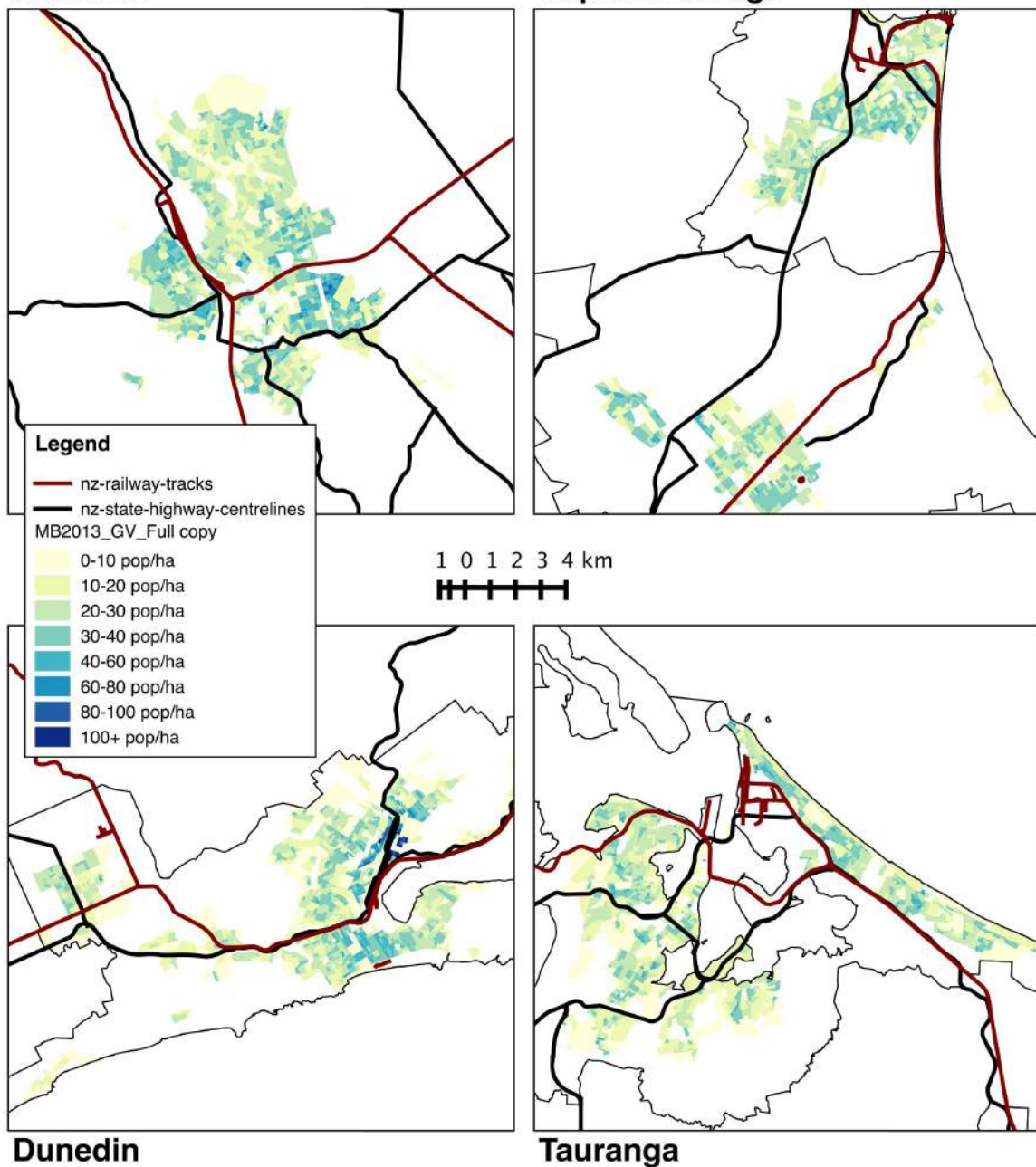
A.1 Population density in four small New Zealand cities

Note that the rail infrastructure shown on this map does not currently provide passenger services.

Population density in four NZ cities, 2013

Hamilton

Napier-Hastings



APPENDIX B**References and further reading**

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Legend

- Bus Route
- Stops

Bus Route

- Tauranga City Council -


0 50 100 200 Km

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Elected Members Bus Trip Itinerary- Examples of Intensification in Tauranga City



Tauranga City Council and Western Bay of Plenty District Council

1 May 2017 – 9 am to 2 pm



Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
	8.45am		TCC meet at 91 Willow Street Office		
1.	9am		WBOPDC meet at 1484 Cameron Rd		
2.		2 km (4 min)	22 Sheppard Street/Greerton Road	Extent: 2470 m ² No. of dwellings: 7 Average dwellings size: 352 m ² Dwellings/ Ha: 28	


Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
3.		1.4 km (3 min)	Jubilee Drive	Extent: 7000 m ² No. dwellings: 17 Average dwellings size: 411 m ² Dwellings/ Ha: 24	
4.		0.5 km (1 min)	Anzac Road (1 st row of houses on Anzac Road between Twenty third Avenue and Dunkirk Street) <i>Infill suburban development</i>	Extent: 8934 m ² No. dwellings: 16 Average dwellings size: 558 m ² Dwellings/ Ha: 18	 



Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
5.		1.7 km (3 min)	<p>Twentieth Avenue</p> <p>(1st row of houses on Twentieth Avenue between Cameron Road and Botanical Road)</p> <p><i>Infill suburban development</i></p>	<p>Extent: 15779 m²</p> <p>No. dwellings: 26</p> <p>Average dwellings size: 606 m²</p> <p>Dwellings/ Ha: 16</p>	 
6.		7.8 km (11 min)	<p>Simms Close</p> <p>(1st row of houses on Simms Close)</p>	<p>Extent: 7523 m²</p> <p>No. dwellings: 14</p> <p>Average dwellings size: 537 m²</p> <p>Dwellings/ Ha: 18</p>	


Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
7.		2.7 km (5 min)	Scoria Close (1 st row of houses on Scoria Close)	Extent: 17367 m ² No. dwellings: 36 Average dwellings size: : 482 m ² Dwellings/ Ha: 21	
8.		9 km (12 min)	162 Waihi Road (SHA)	Extent: 7672 m ² No. dwellings: 31 Average dwellings size: 247 m ² Dwellings/ Ha: 40	


Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
9.		1.3 km (3 min)	Kelvin Way	Extent: 4850 m ² No. dwellings: 12 Average dwellings size: 404 m ² Dwellings/ Ha: 25	
10.		3.7 km (6 min)	Brodie Place	Extent: 8227 m ² No. dwellings: 33 Average dwellings size: 249 m ² Dwellings/ Ha: 40	

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
11.		1.3 km (3 min)	161 Moffat Road <i>The Vines at Bethlehem Lifestyle Retirement Village</i> To be constructed	Extent: 33169 m ² No. dwellings: 189 (2 – 3 bedroom villas) Average dwellings size: 168 m ² Dwellings/ Ha: 59	<p style="text-align: center;"><i>Artist Impression</i></p>  

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
12.		1.6 km (3 min)	112 Carmichael Rd <i>Bob Owens Retirement Village</i>	Extent: 73863 m ² No. beds: 418 (106 townhouses, 113 apartments, 79 assisted living suites and 120 care beds) Average dwellings size: 177 m ² Dwellings/ Ha: 56	
13.		1.7 km (3 min)	St Pauls Drive (1 st row of houses on St Pauls Drive between Solomon Street and Eden Crescent)	Extent: 10058 m ² No. dwellings: 20 Average dwellings size: 502 m ² Dwellings/ Ha: 20	

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
14.		4.4 km (9 min)	10 Tenth Avenue <i>The Avenues Retirement Village</i>	Extent: 8093 m ² No. dwellings: 85 (42 Apartments and 38 bed care facilities) Average dwellings size: 126 m ² Dwellings/ Ha: 79	
15.		0.6 km (1 min)	2 Sixth Avenue	Extent: 5597 m ² No. dwellings: 20 Average dwellings size: 280 m ² Dwellings/ Ha: 36	



Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
16.		0.6 km (1 min)	235 Devonport Road	Extent: 1957 m ² No. dwellings: 10 Average dwellings size: 196 m ² Dwellings/ Ha: 51	
17.		0.6 km (1 min)	1 Selwyn Street <i>To be constructed</i>	Extent: 2746 m ² No. dwellings: 19 Average dwellings size: 144 m ² Dwellings/ Ha: 69	<p><i>Artist Impression</i></p> 

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
18.	10:00 – 10:30	0.2 km (1 min)	<p>Corner of Cameron Road & Hamilton Street</p> <p>Courtyard Café Limited (Jim 0220480467)</p> <p>38 Durham Street</p> <p>Baycourt Bathroom facilities</p>	<p><i>Pick up Coffee at Courtyard Café (order taken on bus)</i></p> <p><i>Pick up Muffins and Lunch at Baycourt theatre</i></p>	<p>Tea Break</p>
19.		0.6 km (1 min)	<p>24 Monmouth</p> <p>To be constructed</p>	<p>Extent: 797 m²</p> <p>No. dwellings: 6</p> <p>Average dwellings size: 132 m²</p> <p>Dwellings/ Ha: 75</p>	<p><i>Artist Impression</i></p> 



Number	Key Times		Location	Key Information on Intensification Example	Images of Examples
20.		0.2 km (1 min)	8-10 Park Street <i>To be constructed</i>	Extent: 1308 m ² No. dwellings: 31 Average dwellings size: 42 m ² Dwellings/ Ha: 238	<p><i>Artist Impression</i></p> 
21.		0.3 km (1 min)	22 Cliff Road	Extent: 1016 m ² No. dwellings: 14 Average dwellings size: 72 m ² Dwellings/ Ha: 139	


Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
22.		0.3 km (1 min)	52 Cliff Road	Extent: 2275 m ² No. dwellings: 8 Average dwellings size: 284 m ² Dwellings/ Ha: 35	
23.		6.7 km (11 min)	154 Marine Parade	Extent: 826 m ² No. dwellings: 5 (apartments) Average dwellings size: 165 m ² Dwellings/ Ha: 60	

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
24.		1.3 km (5 min)	346 Ocean Beach Road	Extent: 2338 m ² No. dwellings: 23 (apartments) Average dwellings size: 101 m ² Dwellings/ Ha: 99	
25.		0.2 km (1 min)	73 Girven Rd <i>To be constructed</i>	Extent: 6838 m ² No. dwellings: 69 (apartments) Average dwellings size: 99 m ² Dwellings/ Ha: 101	
26.	12:00 – 12:45		<i>Papamoa</i> - (Stop Depending on where we are at this time)	<i>Packed lunch provided. Determine stopping point en route.</i>	Lunch

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
27.		0.4 km (1 min)	33 Gloucester Road <i>Somervale - Metlifecare Retirement Village</i>	Extent: 22828 m ² No. dwellings: 86 (70 care units and 16 apartments) Average dwellings size: 265 m ² Dwellings/ Ha: 38	
28.		1.3 km (5 min)	60 Maranui Street <i>Bayswater Retirement Village</i>	Extent: 85077 m ² No. dwellings: 306 Average dwellings size: 278 Dwellings/ Ha: 36	

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
29.		1.5 km (5 min)	<p>210 Maranui Street</p> <p><i>Pacific Coast Retirement Village</i></p> <p>(actual average size 118 m² to 176 m² as there is a lot of internal open space)</p>	<p>Extent: 176326 m²</p> <p>No. dwellings: 272 (162 apartments, 85 villas and 25 aged care facilities)</p> <p>Average dwellings size: 648 m²</p> <p>Dwellings/ Ha: 15</p>	
30.		1.5 km (3 min)	<p>83 Sandhurst Drive</p> <p>(1st row of houses on Sandhurst drive between Granada Street and Gloucester Road)</p>	<p>Extent: 22675 m²</p> <p>No. dwellings: 28</p> <p>Average dwellings size: 810 m²</p> <p>Dwellings/ Ha: 12</p>	

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
31.		1.2 km (5 min)	Te Aranga Drive <i>To be constructed</i>	Extent: 27000 m ² No. dwellings: 51 Average dwellings size: 648 m ² Dwellings/ Ha: 19	
32.		7.3 km (8 min)	44 Blanche Road (1 st row of houses on Sandhurst drive between Doncaster Drive and Rainey Crescent)	Extent: 6706 m ² No. dwellings: 9 Average dwellings size: 745 m ² Dwellings/ Ha: 13	

Number	Key Times	Distance & Travel Time	Location	Key Information on Intensification Example	Images of Examples
33.		2.3 km (5 min)	18/22 Ashely Place <i>Partially constructed</i>	Extent: 7681 m ² No. dwellings: 39 (apartments) Average dwellings size: 197 m ² Dwellings/ Ha: 79	
34.	14:00	21.8 km (20 min)	Arrival back at Western Bay of Plenty District Council (WBOPDC)		

Supporting Information on Density

1. Context

Tauranga City's density was 7.96 people per hectare (ha) at 30 June 2006 (107,000 people / 13440 ha), and 8.91 people per ha as of 30 June 2013 (119,800 people/13440 ha). Tauranga's Current density based upon a population of 128,000 and 13,440 ha land is 9.52. Applying the density of 9.52 across the combined area of TCC and WBOP would mean the WBOP could hypothetically house a population of 2, 146,188.

Below is a simple average density comparison between New Zealand cities ranked according to 2016 density figures:

Table 1: New Zealand Cities and Density

	Area		Stats NZ Estimated Resident Population (30 June)			2016 Density		Density (earlier)	
	km2	Ha	2006	2013	2016	km2	ha	2006	2013
NZ Cities									
Hamilton	110.95	11,095	134,800	150,200	161,200	1452.9	14.53	12.1	13.5
Tauranga	135	13,500	107,000	119,800	128,200	949.6	9.50	7.9	8.9
Wellington	288.97	28,897			207,900	719.5	7.19		
Napier	105	10,500			61,100	581.9	5.82		
Auckland	4,940	494,000			1,614,300	326.8	3.27		
Christchurch	1493.49	149,349			375,000	251.1	2.51		
Palmerston North	395	39,500			86,300	218.5	2.18		
Dunedin	3,287	328,700			127,000	38.6	0.39		
Rotorua	2,409	240,900			70,500	29.3	0.29		
Western Bay of Plenty District	1,951	195,100			47,800	24.5	0.25		

Table 1: WBOP Areas and Density

Urban Areas	Area (ha)	Population (2013)	2013 Density	Population calculated at 9.52
Katikati Community	878.67	4056	4.62	8365
Omokoroa	749.50	2547	3.40	7135
Te Puke	1632.35	7494	4.59	15540
Maketu Community	581.83	1047	1.80	5539
Te Puke West	684.60	4488	6.56	6517
Te Puke East	947.76	3006	3.17	9023

The table above reflects urban areas like Te Puke, Katikati, Omokoroa, and other small towns. The last column in the table provides population calculated using the Tauranga City 2016 estimated density (9.52 people per hectare).

By **2028** Tauranga's population is projected to be 154,900. With Keenan Road and Tauriko areas added in (although not expected to be at capacity) the density will be **11.13** people per ha (154,900/13,915).

If we take all of Western Corridor areas (Upper Belk +460 ha, Merrick Road +160ha, Upper Joyce +135ha) and other potential areas (Upper Ohauti and Pukemapu +200 ha approximately) and then divide by the **2063** population projection – (i.e. 198,374 people/14,870 ha) we get a population density of **13.34** people per ha.

2. Population-weighted Density

The densities reflected above are simple measures of average density which is the most common way of measuring density where number of people living in the city is divided by the city's total land area. This measure of density however often produces misleading results as density is seldom homogenous within urban areas. Larger and growing cities tend to have mix of densities as residents have a range of different preferences, occupations and incomes.

A more robust measure of density would be developing a population-weighted density. In contrast to simple average density measures this measure estimates the density at the neighbourhood level. As a result, this measure is much more representative of the lived experience of density by city's residents.

For your information a working paper by MRCagney PTY Ltd is provided in this regard- *Population-weighted densities in New Zealand and Australian cities: A new comparative dataset (2014)*. The study shows Tauranga as having a 5% increase in density between 2001 and 2013 and refers to the city's weighted density as 22.6 (as of 2013).

3. Approach to Density in relation to the Bus trip- (Methodology)

The density measure used for the analysis of the bus trip examples reflected in the itinerary was *Neighbourhood Density*. In this case density is measured over neighbourhood units, excluding all land uses that lie outside those units. Includes local roads (access streets), local open space (neighbourhood parks), and street blocks (allotments). Excludes: higher and middle order roads (freeways down to collector roads) and all other types of open space. It also excludes purely non-residential land uses, but includes mixed use containing residential.

This is a commonly used density measure that relates to the developable land definition referred to below (from *Part A – Definitions of Bay of Plenty Regional Policy Statement*):

Developable land:

(a) Comprises land used for:

- (i) Residential activity purposes, including all open space and on-site parking associated with dwellings;
- (ii) Local roads and roading corridors, including pedestrian and cycle ways, (and excluding State highways and other major arterial routes, as determined by the local roading hierarchy);
- (iii) Collector roads and roading corridors (as determined by the local roading hierarchy), where direct access from lots is obtained. Where lots on only one side of the road have direct access only 50% of the corridor shall be used for the purpose of this definition;
- (iv) Local neighbourhood reserves.

(b) Excludes land that is:

- (i) Stormwater ponds and detention areas;
- (ii) Geotechnically constrained (such as land subject to subsidence or inundation);
- (iii) Set aside to protect significant ecological, cultural, heritage or landscape values;
- (iv) Set aside for non-local recreation or esplanade reserves or access strips that form part of a larger regional, sub-regional, or district network;
- (v) Identified or used for non-residential activity including business activities, schools, network utilities, health centres or other district, regional or sub-regional facilities.

4. Site Level Density Analysis (Interpreting the Bus Trip Examples)

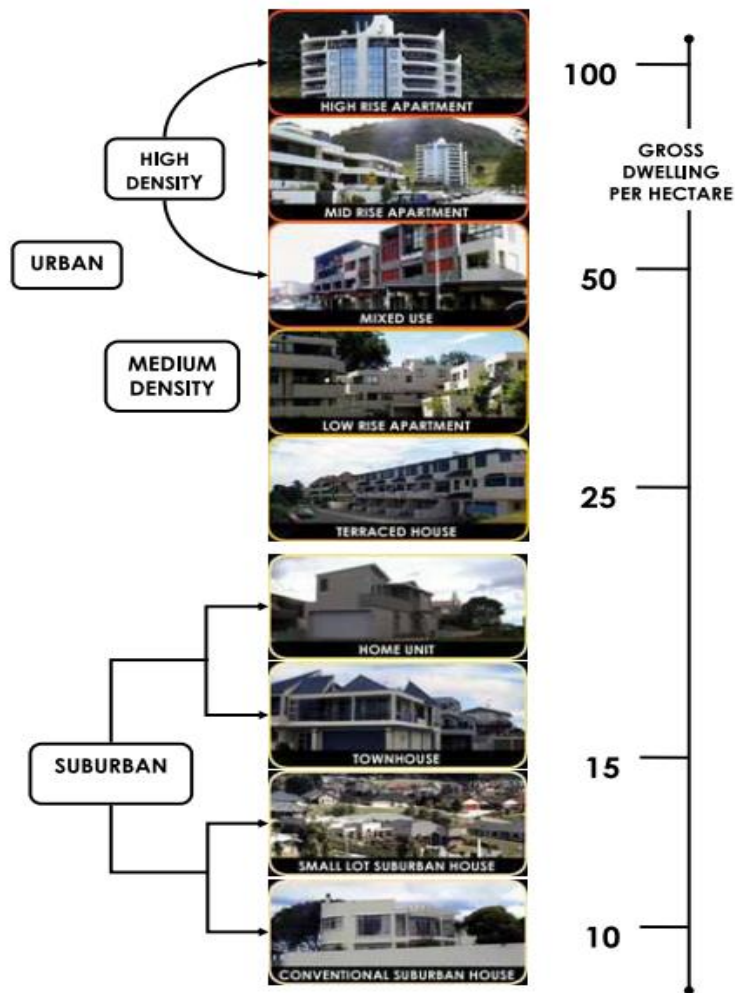
Neighbourhood Density was used to determine the extent of each example. The number of dwellings generally referred to the house, unit, apartment or other place of residence. The average dwelling size was determined by dividing the extent of the example by the number of dwellings.

In order to do some comparative analysis across the examples an absolute or simple example level density was calculated by dividing a hectare by the dwelling size.

5. Tauranga Density Examples and the Density Spectrum

Below is the SmartGrowth Strategy (2013) diagram reflecting scale of density in Tauranga:

Illustrations of Residential Development Types in the Western bay of Plenty



6. Regional Policy Statement and Density

Below are the density targets in the RPS policy in relation to Urban and Rural Growth Management:

Policy UG 4A: Providing for residential development yields in district plans - western Bay of Plenty sub-region

Provide for dwelling yields per hectare of developable land within identified urban areas to be delivered as follows:

(a) Greenfield urban growth areas

An average net yield of 12 dwellings or more per hectare from 1 July 2012, rising progressively to 15 dwellings or more per hectare by 1 July 2037.

(b) Urban intensification areas

An average net yield of 20 dwellings or more per hectare of developable land within each urban intensification area.

7. Tauranga City Infill and Intensification Initiatives

Below is a summary of infill/intensification developments in Tauranga City that have been consented over the last 12 months, or are currently going through preliminary stages of consenting. This data has been gathered by the TCC Environmental Planning team. This information gives an indication of the quantum and type of developments that are delivering infill and intensification across the city.

7.1 Resource consents granted

- 436 Maunganui Road – mixed-use - 29 units + 6 commercial tenancies
- 33 Miro Street – 12-unit high density development
- 143 Moffat Road (Mills Reef site) – 198 unit retirement village
- 34 McFetridge, Ohauti – 10 lots infill
- 145 Durham Street – 11-storey student accommodation complex (~100 units)
- 123 Pyes Pa Road – 4 lots (< 325m²)
- 362 Maunganui Road – 5-unit high-density development
- 16 Reynolds Place - 64 lots (terrace housing)
- 160 Maranui Street - Pacific Coast stage 2 – 80 aged care units

7.2 Special Housing Areas

In addition to the above, out of the 2,705 total dwellings provided for within approved Special Housing Areas, 383 dwellings represent infill/intensification:

- 162 Waihi Road – 31 units (under construction)
- Smiths Farm – 180 – 250 lots
- Girven Road – mixed use – 66 units and commercial tenancies
- Domain Road – mixed use – 36 apartments/terraces plus commercial tenancies

7.3 'Pipeline' projects

TCC staff are involved in pre-application discussions, or currently going through the application process, regarding around a dozen development proposals for higher density developments, totalling approximately 350(+) units and two large scale retirement complexes. These are summarised below in general terms (to respect commercial sensitivity) below:

- five apartment developments (3 in the City Living Zone) – 105 units.
- four 45+ terrace-type developments on large sites in commercial & residential zone – 245(+) units
- two large-scale retirement complex developments - 400+ units

7.4 Summary

The table below summarises the projects outlined above:

Resource Consents	Special Housing Areas	'Pipeline' Projects
224 units 278 aged/retirement units	383 freehold dwellings	350(+) freehold dwellings 2 large-scale retirement complexes (400+) units
Total		
957(+) freehold dwellings 678(+) aged care/retirement units		

These projects, if they proceed to development, would likely be spread over the next 5 years. Averaged over 5 years, this represents ~330 dwelling units per annum. Using the 2015/2016 figure for total new dwellings for Tauranga City (1493), ~330 dwelling units per annum would represent a rate of approximately 22% per annum for infill/intensification from 2016 - 2021. When added to typical rates of infill (~12% per annum) this equates to ~34% of total new dwellings being delivered through infill or intensification.