



Monitoring Research Quarterly, MRQ is the newsletter of Auckland Council's Research and Evaluation Unit, RIMU. The newsletter contains reports of RIMU's current work including information about recent publications, research, facts and trends about Auckland. RIMU publications are available on the Auckland Council and Knowledge Auckland websites.

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## Space: the final frontier. Smart cities as urban ecosystems

Dr Nancy Golubiewski, RIMU senior researcher, talks about her presentation to the Association of Local Government Information Management, ALGIM.

I gave an invited keynote presentation to the 2016 ALGIM annual meeting, themed *Shaping the future, leading the change*<sup>1</sup>. A somewhat daunting task for an ecologist to speak on this subject to a room full of ICT professionals, not helped by the fact that a world-leading futurist, Thomas Frey, spoke the day before.

I loved the theme of this meeting: *Shaping the future, leading the change*. Yes, exactly: we, by virtue of our chosen fields and our roles as public servants, are all interested in how society functions – both in the present and possible future pathways for improved societal outcomes.

The future may be predictable (as envisioned by futurists such as Frey) but is unknowable (given the human tendency to surprise ourselves through disruption and the ever-quicken pace of innovation). Either way, my ecological premise is that the future is already here, given that the template for our lifestyles and our technology is already embedded in the natural resources of this planet.

As society is radically altered by not just new gadgets, but also new ways of being and doing, we still live our very human lives. In this digital age, the mantra for health and well-being is to disconnect... from our digital devices and social media streams. The corollary action, of course, is to CONNECT – to people and to place. And so, we can use the mindfulness mantra of the 21<sup>st</sup> century to **be here now** to guide our future, rather than looking to cyberspace or the heavens to save us from ourselves.

You may have seen last year that Stephen Hawking has given humans an expiration date only 1000 years from now due to a number of possible cataclysmic events or crossed thresholds, not least of which are the effects of climate change. He seeks to send nanoprobes into space to explore

back-up homes for the universe – to explore strange new worlds, to seek out new life and new civilization, to boldly go where no one has gone before. And Elon Musk of Tesla would like to colonise Mars for the sake of humanity after planet Earth is trashed. I, instead, would like to raise the radical notion to turn our lens back onto Earth, this space, as our final frontier. How do we share our finite planet, most especially the land upon which we stand? The frontier is one of knowledge generation and creative management of the Earth system.

In truth, there are no physical frontiers left: we have explored this planet. Indeed, there are no wild places left. From Antarctica, to the highest alpine lakes in the Rocky Mountains, no place on Earth is unaffected by humans, whether by direct use or atmospheric deposition of pollutants. Welcome to the Anthropocene. Since the beginning of the Industrial Revolution in the 18<sup>th</sup> and 19<sup>th</sup> century, there has been a marked increase in the material and energy flows of the Earth system, as well as the production, consumption, and general activity of the cumulative effects of humanity. The Great Acceleration began in 1950 after WWII when both the technological advancements of the war effort hit the mainstream as did the golden age of affluence, at least in the western world. During this time, consumption overtook population itself as a driver of change through everything from nitrogen use and energy to the number of McDonald's opening across the globe.

1. *Shaping the future, leading the change*, 2016 Annual ALGIM Conference. SKYCITY Auckland, 21-23 November 2016

One of these exponential acceleration metrics is urbanisation. Not only is Earth the living planet, it is also the **urban planet**. It has been said that "Rapid urbanisation is one of the biggest social transformations in human history."<sup>2</sup> Last year, the UN's Habitat III conference met in Quito, Ecuador to adopt a global framework for making cities sustainable – the New Urban Agenda – and scientists are called upon to provide expert knowledge and evidence to guide the challenges presented by cities: "complex and interrelated questions about equity, justice, resilience, economic opportunity, infrastructure development, ecological restoration"<sup>2</sup> and integrity. The role of transdisciplinary urban science, then, is quite literally shaping the future; leading the change. And our future is already here: embedded in the ground beneath our feet, the water we drink, the air we breathe.

To that end, I'm going to challenge how we conceive and implement the idea of a smart city. There are two pervasive definitions:

1. Wired up cities: the extent to which cities have pervasive computing, digital connection, and sensor networks – the idea of "everyware"<sup>3</sup>.
2. A broader definition relating to the knowledge economy through a city region: "a smart city is one whose economy and governance is being driven by innovation, creativity and entrepreneurship, enacted by smart people". It is not the ICT itself that makes a city smart, but how it, "in conjunction with human and social capital and wider economic policy, is used to leverage growth and manage urban development that makes a city smart".

What does it take to be a smart city? Five main characteristics are proposed in the industry and government literature:<sup>4</sup>

1. Widespread embedding of ICT into the urban fabric
2. Business-led urban development and a neoliberal approach to governance
3. Focus on social and human dimensions of a city from a creative perspective
4. Adoption of a smarter communities agenda with programmes aimed at social learning, education, and social capital
5. Focus on social and environmental sustainability

There are inherent tensions in these parallel strands. While much attention is often paid to characteristic 1, the long-term, future outlook belongs to characteristic 5, allowing me to put forward this premise: A smart city is one that takes a systems approach, acknowledging the components of which it is comprised: the biophysical template upon which the urban matrix exists, and the social, cultural, historical, economic fabrics that comprise the conurbation itself. A city, as any ecosystem, has both form and function, pattern and process. A systemic perspective allows recognition of these components, as well as how the whole is greater than the sum of those parts. For Auckland to be a smart city, it must also be:

- A liveable city
- A productive city – supporting creativity, forward-looking to iterations, disruptions, and innovations<sup>5</sup>
- A heritage city – acknowledging its spiritual and cultural inheritance
- A multicultural city – embracing its current diversity
- A coastal city – recognising and accommodating its bicoastal setting
- A biophysical city – accommodating its geologic,

2. McPhearson, T. 2016. Scientists must have a say in the future of cities. *Nature* 538: 165-6

3. Kitchin, R. 2014. The real-time city? Big data and smart urbanism. *GeoJournal* 79:1-14

geographical, and biological settings

- An ecological city – operating as an urban ecosystem of forest, wetland, beach, farmland, and built environments (among others)
- A connected city – to people and to place

What does this mean when we live in the present, trying to lead the change to shape the future? Consider three pillars upon which to base the operation of smart cities:

## 1. Confront the status quo and conventional wisdom

Recognising that this work occurs in a particular framework, with its own baggage, be it history or politics, it is necessary to question "this is the way we do things" arguments while investigating issues and exploring opportunities without predetermining outcomes.

## 2. Generate knowledge

With a trillion sensors in the world,<sup>6</sup> data can be gathered. With such a rich resource, we still need to figure out what we can know and understand. We need insight and knowledge about the world we can measure, which then needs to be communicated usefully in support of operations, management, and decision-making.

## 3. Master the interplay of complexity and simplicity

Much attention has been given to the need for clear science communication through a variety of media that can connect with hearts and minds. While endeavouring to do so, resist the soundbite mantra: let's expect more from public discourse and engagement than tweeting. While providing clear messages about complex issues is important, it is also important to allow complexity to exist with the acknowledgement there is variability and uncertainty in the world. This is a two-way street: not only does science communication need to be clear, but also it is the responsibility of all those involved (local government staff and elected officials, scientists, journalists, business people, the public at large) to be literate in these concepts.

Thus, the smart city becomes adaptable and resilient.

In this age of data explosion, we have to keep seeking to understand the system, to generate knowledge so that we can make decisions about how we use and manage our space. In times of growth, how will a smart city use its land? Society faces the need to manage complex situations – indeed, it is harder than rocket science. One reason: it is a messy process to deal with a social fabric comprised of many human actors. Another is that knowledge is based on iterations, with variability and uncertainty, often offering a menu of options or scenarios, but our decision frameworks (and public conversations) are often more comfortable with one firm number or answer.

Indeed, shaping the future means acknowledging change, and for that reason, the science/policy interface deserves support, not scepticism, in its attempts to make informed decisions.



4. Holland 2008, as noted in Kitchin 2014

5, 6. Borrowing Thomas Frey's categories. Frey, T. 2016 ALGIM Conference

# Australasian Housing Researchers Conference, Melbourne

Auckland Council has an active interest in understanding housing issues in order to effectively advocate for positive change and set effective evidence based policy to address issues of housing affordability, housing quality and access to safe 'fit for purpose', housing in Auckland. To that end, RIMU researchers Jennifer Joynt and Alison Reid represented Auckland Council at the recent Australasian Housing Researchers Conference held in Melbourne.

The conference attracted academics, independent researchers and local authority representatives from Australia and New Zealand. The theme of the conference, *Global inequalities and housing: the Australasian agenda*, generated interesting discussion about contemporary housing issues, through the presentation of case studies, as well as reflection on historical policy and how this has influenced the outcomes affecting us today.



One of the important themes which emerged from the conference was recognising the geopolitical nature of housing markets. Keynote speaker Dr Dallas Rogers (University of Sydney) noted that Australia has long been subject to foreign land claims, and that contemporary global flows of capital to acquire land are not dissimilar to earlier colonial times. He argued that the increased financialisation of houses is compounding the issues of housing inequity and exacerbated housing disadvantage.

The conference had a strong focus on social, economic, and policy drivers and the implications of decreasing levels of homeownership and increasing reliance on the rental sector in Australasia- across all groups in society. Current housing related practices and policies were linked with growing intergenerational inequity impacting the traditional housing life course for younger generations, particularly those whose parents were not asset rich homeowners.

This shift was at the heart of the keynote speech by Richard Ronald in which he suggested that '...the world is dividing between those who are children of home-owners and those who are not'. Richard presented the HOUWEL project ([www.houwel.uua.nl](http://www.houwel.uua.nl)), which aims to understand whether 'generation rent' is an issue, using six different countries as case studies to compare the social impacts from having more or less opportunity to enter the housing market.

One of the most interesting examples was from Japan, where the social effects of the 1990s housing bubble implosion, combined with the deregulation of the labour market has been correlated with the rise of FREETERS (a Japanese term which means someone in their 20s who moves from job to job, mainly part time jobs which pay low wages, and thus have little opportunity for wealth creation) and NEETS (Not in Employment or Education), another rather unkind term for this rising cohort is the 'parasite singles'. Richard Ronald noted that the inability to gain independence and enter the usual course towards adulthood associated with house ownership has an impact on population growth as very few children are born to unmarried couples in Japan. Obviously, Japan has a different cultural context than New Zealand, but it could serve as a further warning about the social inequity and future risks caused by an insecure housing model.

The Japanese case study was contrasted to the Netherlands, where there are no generation rent issues, as up until very recently it has been the 'paradigm of social housing', and social housing has not just been provided for those at the margins, but as a viable and attractive housing option for all. In the private rental sector, following one year of a tenant's occupation of the house, they have the right to permanent residency. Although the benefits of this system have been proven with the lack of a 'generation rent' in the Netherlands, changes are creeping in which could mean that this status will slowly be eroded in favour of the neo-liberal model seen throughout the western world.



RIMU's research presentations fitted well with the conference theme and were well received. Jennifer presented a paper, *Power relations in a pressured rental market: the role of property owners as rule makers and tenants as rule takers*, which is from the forthcoming *Renting in Auckland* report which emerged from a BRANZ funded report on renting in New Zealand, (Witten, et al., 2017). Jennifer's presentation reported the findings of qualitative interviews with tenants and landlords in the Auckland rental market highlighting the inadequacies of the Residential Tenancies Act and the effects of power erosion on tenant experience.

Alison's presentation was titled *Gate-keeper and head sheriff: attitudes towards owners and tenants among residential property managers in Auckland, New Zealand*. The residential property management sector plays a significant role in the lived experience of many renter households; however, its cumulative function in the private rental system is not well understood. As part of Auckland Council's broader involvement in the renting in Auckland project, Alison undertook in-depth interviews with a sample of residential property managers last year, and is currently finalising her analysis.

Alison and Jennifer enjoyed the conference and they noted that the feedback and questions received during the presentations, as well as engagement with colleagues from around Australia, New Zealand and beyond gives new insights into the way we can address housing related problems here in Auckland.



# C40 Greenhouse gas measurement workshop

Auckland Council hosted the C40 Greenhouse Gas Measurement workshop, 6-10 March.

The C40 Measurement and Planning Initiative focuses on building capacity in member cities to tackle climate change by measuring greenhouse gas emissions and climate impacts, annual reporting of climate data, and development of climate action plans. The aim is for every city to have robust, up to date emissions data measured in a consistent way, an evidence-based climate action plan with clear ownership and implementation, and transparent and comprehensive annual reporting.

RIMU's Dr Shanju Xie and Dr Parin Thompson from council's Sustainability Office attended the workshop as members of the C40's greenhouse gas technical working group.



Workshop participants visit the food waste compost facility at Ōrākei Marae

## Recent research activities

RIMU's scientists, researchers, technical specialists and analysts have assisted with many Auckland Council projects over recent months. A list of recent publications and research related activities follows.

- New reports:

- *Auckland east coast estuarine monitoring programme: report on data collected up until October 2015*, TR2017/003

- *Auckland east coast subtidal reef monitoring programme: 2007 to 2013*, TR2017/002

- *Auckland Plan targets: monitoring report 2016*, TR2016/042

- *Auckland's greenhouse gas inventory to 2014*, TR2016/044

- *Beach change in the Auckland region: current state and trends*, TR2016/048

- *Determinants of wellbeing for older Aucklanders*, TR2016/047

- *The early years: a literature review on early childhood development, learning and care for children aged 0 – 5 years*, WR2017/001

- *Elemental analysis results for air particulate matter collected in Auckland 2006-2015 – a summary report*, TR2017/001

- *Immigration, ethnic diversity and cities: a literature review for Auckland Council*, TR2017/008

- *Doing ethnic diversity at Te Kaunihera o Tāmaki Makaurau: workshop summary*

- *Quality of Life Survey 2016 – results for Auckland*, TR2016/043

- *The relationship between pedestrian connectivity and economic productivity in Auckland's city centre*, TR2017/007

- *River water quality annual report 2015*, TR2016/034

- *Soil quality for drystock and lifestyle-converted sites in the Auckland region in 2015 and changes after 20 years*, TR2016/045

- Knowledge Auckland [www.knowledgeauckland.org.nz](http://www.knowledgeauckland.org.nz)  
RIMU's research information website, continues to publish Auckland related research, live on the Net.

- We hosted a RIMU Insights presentation by Dr Kay Saville-Smith, *Auckland's future: dealing with ageing and our housing system*

- RIMU researchers have been working with the New Zealand Treasury on the Treasury's *Auckland story* report.

- RIMU is working with council's Regulatory Services, Plans and Places and the Mana Whenua Cultural Values Working Group on the Mana Whenua Cultural Values and Resource Consents research project.

- Social science researchers are working closely with Statistics New Zealand on preparing for the 2018 census.

- RIMU is working with council's Development Programme Office and the Heart of the City organisation on data for the City Centre Report Card.

- RIMU scientists are leading the evaluation of council's Safe Swim programme

- The first RIMU invertebrate monitoring programme was completed and collected ground insects at Shakespear and Tawharanui regional parks. We collected 480 invertebrates from pitfall traps – 29 sites at Tawharanui and 31 sites at Shakespear. University of Auckland scientists are assisting with identifying the invertebrates.

- Social impacts of ethnic diversity: RIMU facilitated workshops that informed 'thought leadership' on ethnic diversity in Auckland and helped with developing a council diversity policy. The workshops used the RIMU literature review *Immigration, ethnic diversity and cities* (TR2017/008) and we published an associated report *Doing ethnic diversity at Te Kaunihera o Tāmaki Makaurau: workshop summary*

- RIMU scientists are working on acquiring ISO 9001:2015 accreditation.

- We're working with NIWA and council's Environmental Services on using NIWA's CO<sub>2</sub> data for monitoring Auckland volcanic activity.

- A RIMU symposium is planned for July with Sir Peter Gluckman as keynote speaker.

The reports noted here are available on the Auckland Council or Knowledge Auckland websites.

# Auckland Unitary Plan rural subdivision – What are the numbers?

As Auckland grows, the demand to accommodate Auckland’s rising population puts enormous pressure on land supply. While the Auckland Unitary Plan aims to further intensify the existing urban area and preserve prime rural land, its provisions have been questioned and challenged many times by lawyers, planners, politicians and community organisations.

The Auckland Unitary Plan, Auckland Council Decision Version (ACDV) was released in August 2016. While some recommendations were incorporated into the Plan, some such as the rural subdivision rules were rejected. As a result, a number of appeals against the ACDV are before the Environment Court.

The latest question raised by the appellants is whether council has been overly restrictive in the rules on rural subdivision under the ACDV provision. If proven so in court, the appellants seek the relief of reinstating the Independent Hearings Panel’s Recommendation Version (IHPRV) of the Plan. The Land Use Team is using spatial modelling to demonstrate the differences between the two versions of the Plan.

As the basic structure of the two versions of the Plan is constant, a similar approach to each of the models was used. A simplified overview of the models is shown in Figure 1.

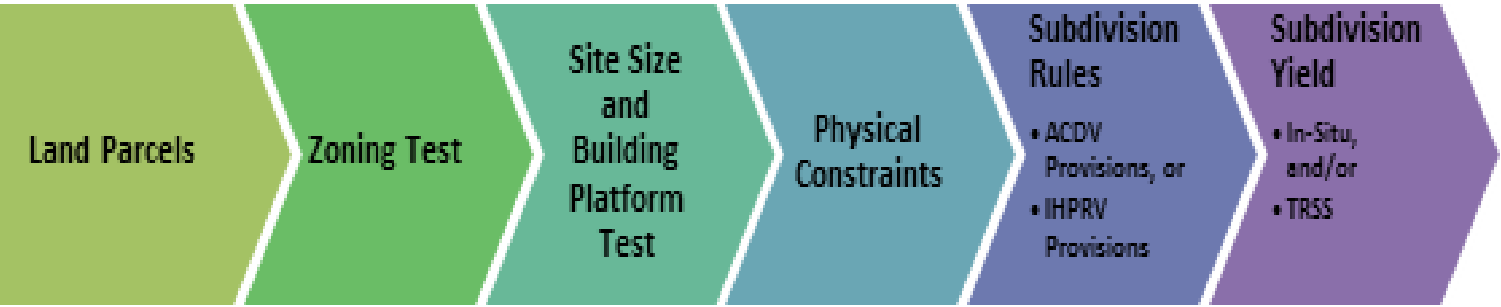


Figure 1. Rural subdivision modelling process

Each rural title represented in the model was tested against its zoning type, minimum site size and building platform requirements, physical constraints identified by the Plan, and corresponding subdivision rules to generate indicative development capacity.



Greenfield conversion, Pukekohe



## What are the main differences and what are the outcomes?

Both Plan provisions recognise the two categories of rural subdivision, namely in-situ subdivision and transferable rural site subdivision (TRSS). In-situ subdivision is the activity that involves subdividing a parent lot into two or more smaller titles. TRSS, also known as transferable development right, is the ability of transferring the subdivision right from one title (Donor) to an appropriate title (Receiver).

In terms of how the two subdivision types can be used, the two Plan provisions have taken divergent paths on various rules. For example, the ACDV caps the maximum numbers of on-site and transferable subdivisions by almost a quarter as compared to the IHPRV. In addition, the ACDV identifies that vegetation and wetland protection can only be carried out within the Special Ecological Areas (SEA) in order to trigger development potential.

In contrast, the IHPRV recognises all protected vegetation and wetland in the rural title which meet SEA standards to be counted for additional development potential of vacant areas. The full details of the differences can be found in the *Auckland Unitary Plan rural subdivision appeals - planned enabled capacity modelling initial report* prepared by the Land Use Team for the Environment Court. The results from the models are presented in Table 1.

At a glance, the differences between ACDV and IHPRV are significant, especially in the rules relating to vegetation and wetland protection, as well as the revegetation planting categories. The IHPRV allows significantly more development opportunity in both in-situ and TRSS options.

A question arising from this comparison exercise is: how should the finite rural land area be sustainably managed or developed?

For more information about rural development capacity modelling, please contact RIMU's Land Use Team.

Vegetation protection	ACDV	IHPRV	Difference
In-situ	790	1948	1158
TRSS (Donor)	1412	2127	715
<b>Revegetation planting</b>			
In-situ	3038	22,265	19,227
TRSS (Donor)	3080	22,618	19,589
<b>Vegetation protection (Wetland)</b>			
In-situ	0	906	906
TRSS (Donor)	267	950	683
<b>Vacant site amalgamation</b>			
TRSS (Donor)	1850	1850	0
<b>Minimum site area</b>			
In-situ	968	968	0
<b>Countryside living</b>			
In-situ	2960	2945	-15
TRSS (Net receiver)	3251	3251	15
TRSS (Receiver)	5771	5771	0
<b>Waitākere Ranges</b>			
In-situ	7	7	0

**Table 1. Summary of rural subdivision yields**

Note: the numbers are likely to change as model data is updated constantly.

### Acknowledgements

Page 1 banner graphic: <http://tatavaluehomes.com/blog/index.php/2015/09/25/smart-cities-ahoy> |  
Page 2 graphic: <https://www.geospatialworld.net> etc.

For more information about Auckland related research, data and monitoring programmes visit the Research Unit's websites:

### Knowledge Auckland

[www.knowledgeauckland.org.nz](http://www.knowledgeauckland.org.nz)

### State of Auckland

<http://stateofauckland.aucklandcouncil.govt.nz>

### Auckland Counts, census data

[www.censusauckland.co.nz](http://www.censusauckland.co.nz)

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