

*Infrastructure Management*

**Ingenium Conference 2013**

**Infrastructure Management  
Forecasting the Changes to 2030**



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## Quality Record Sheet

### Infrastructure Management Forecasting the Changes to 2030

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## 1.0 ABSTRACT

### **Infrastructure Management – Forecasting the Changes to 2030**

New Zealand's infrastructure management practice has grown and developed over the past two decades. The November 2012 NAMS Forum concluded that the development of practice had plateaued, and that fresh direction and emphasis was needed.

Multiple trends continue to impact our communities, their requirement for services, and subsequently the infrastructure and assets that are required to provide these services.

These trends will be summarized and then used to forecast changes that will be required in infrastructure management through to 2030.

The forecast will be developed to provide infrastructure custodians and managers with thought provoking challenges, opportunities and guidance as to the pathways forward.



## 2.0 INTRODUCTION

Profound pressures are starting to shape the provision of infrastructure in New Zealand. These pressures are long term and can be predicted.

The impact of the pressures will vary, and our communities and subsequently the infrastructure sector responses to the pressures have yet to be determined.

This paper looks at the issues and pressures, and then attempts to predict some of the changes that will occur of the next 20 to 30 years.

The pressures are:

- New Zealand is doing extremely well by international standards – this will lead to long term sustained immigration and growth pressure
- New Zealand is in a period of sustained fiscal restraint
- New Zealand population continues to grow and cluster in the upper North Island
- Demographic changes are increasing and most growth will be in 65+ years population
- New Zealand is still a relatively young country and much infrastructure development and growth is needed

These long term pressures will have impact across the infrastructure sector in:

- Planning and urban forms
- Transportation infrastructure
- Utility Infrastructure
- Parks, Property and Community Infrastructure

The need for infrastructure management and planning will increase significantly as a result of these long term pressures, and it is likely that when looking back in 2030 we will view the last 17 years of infrastructure management practice (1996-2013) as only the first steps.



### 3.0 NEW ZEALAND IS DOING WELL

New Zealand is doing exceptionally well in a wide range of international comparisons and indicators. You will never know any of this by listening to or watching New Zealand's main stream media – it does not fit their generally negative narrative.

The indicators are compiled by leading international agencies, and as such they paint a picture of New Zealand being one of the nicest, safest, most pleasant and most prosperous countries in the world to live in. In indicators of whole of life prosperity New Zealand is consistently in the top 10 countries in the world. If you focus just on our economy, we are in the top 30 in the world.

From an infrastructure investment and service provision perspective what this simply means is that there will be sustained investment in infrastructure, people from all over the world are going to continue to want to live in New Zealand.

Contrary to the popular myth there will never be the last person leaving to Australia turning out the lights.

As infrastructure practitioners we have on-going work to do to sustainably build, renew, and maintain the infrastructure needed for New Zealand's continued growth, economy and overall prosperity.

### 3.1 Top of the Class

Figure 3.1: New Zealand Top of the Class

**Top of the class**  
2012 index rankings

Overall rank*	Country	Global competitiveness	Ease of doing business	Global innovation	Corruption perceptions	Human development†	Prosperity
1	Sweden	4	13	2	4	10	3
2	Denmark	12	5	7	1	16	2
3	Finland	3	11	4	1	22	7
4	Norway	15	6	14	7	1	1
5	Switzerland	1	28	1	6	11	9
6	New Zealand	23	3	13	1	5	5
7	Singapore	2	1	3	5	26	19
8	United States	7	4	10	19	4	12
9	Netherlands	5	31	6	9	3	8
10	Canada	14	17	12	9	6	6
11	Hong Kong	9	2	8	14	13	18
12	Australia	20	10	23	7	2	4
13	Britain	8	7	5	17	28	13
14	Germany	6	20	15	13	9	14
15	Ireland	27	15	9	25	7	10

Sources: World Economic Forum; World Bank; INSEAD and World Intellectual Property Organisation; Transparency International; UNDP; Legatum

\*Based on equal weighting of indices †2011 ranking

Source: *The Economist*  
Date: 2 February 2013

### 3.2 Prosperous New Zealand

In the 2012 Legatum Prosperity Index Rankings New Zealand is 5<sup>th</sup> in the World.

Figure 3.2: 2012 Legatum Prosperity Index Rankings



Source: Legatum Institute

Date: 2012

Legatum Index – mix of economy and social/lifestyle – NZ 5<sup>th</sup>.

Economy lower but Governance, Education, Personal Freedom, and Social Capital high by international comparison.

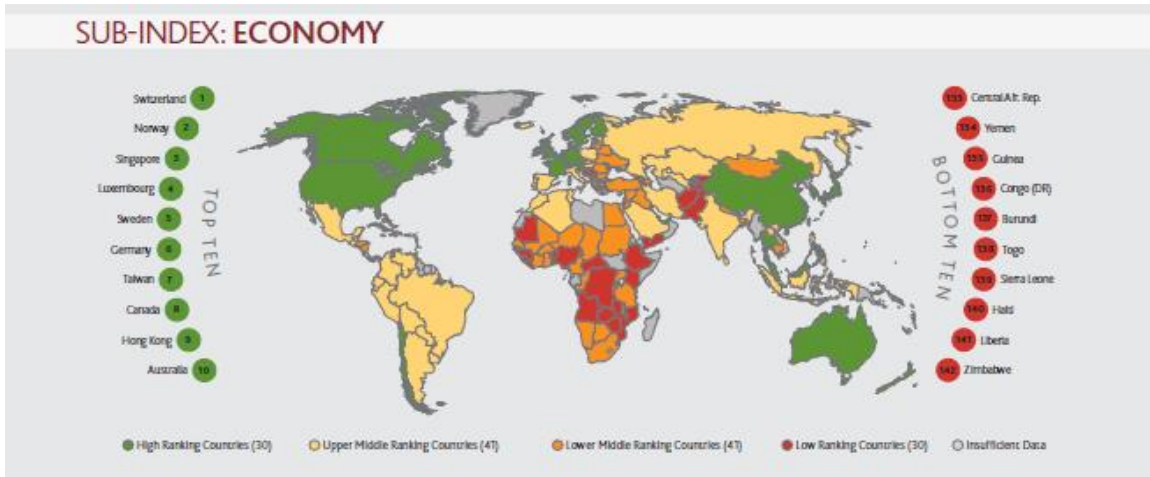
Local Governments contributions are part of the Governance and Social Capital rankings.

Based on this ranking and the graphic it can be seen that New Zealand’s peer countries (in the top 10) are the Nordic Countries – Norway, Denmark, Sweden, Finland; our Commonwealth friends Australia and Canada; the Netherlands, Switzerland and Ireland.

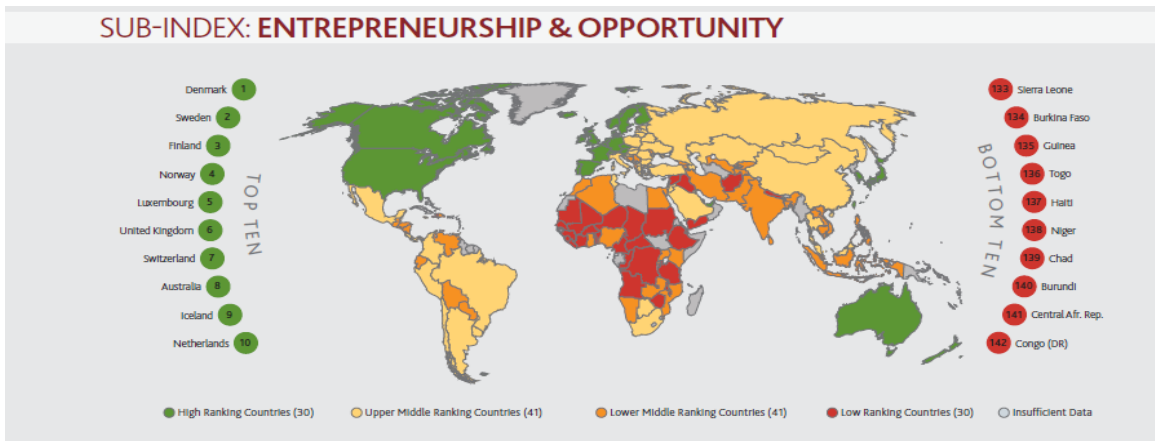
### 3.3 The Company NZ Keeps

More detailed Legatum sub-index rankings are shown in the figures below:

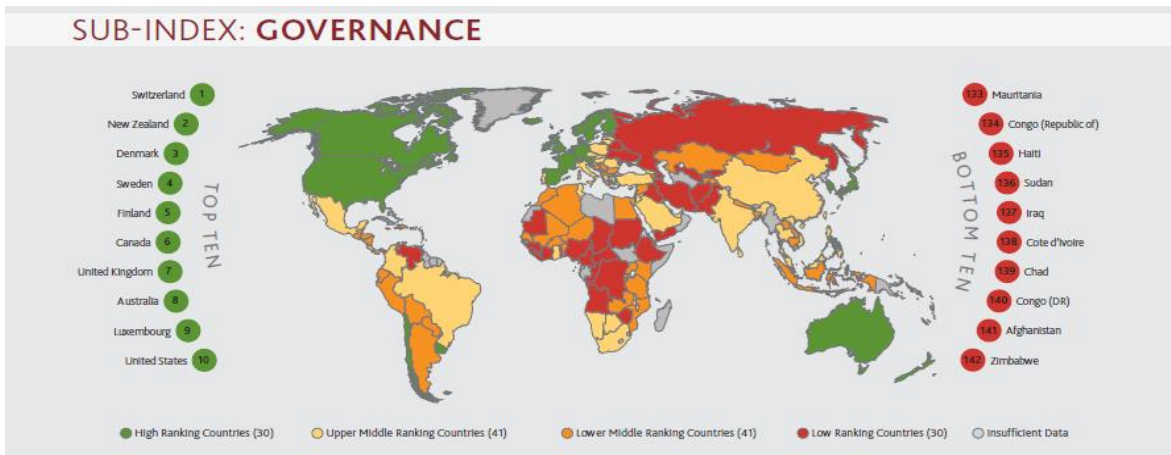
**Figure 3.3: Legatum Sub-Index: Economy**



**Figure 3.4: Legatum Sub-Index: Entrepreneurship & Opportunity**

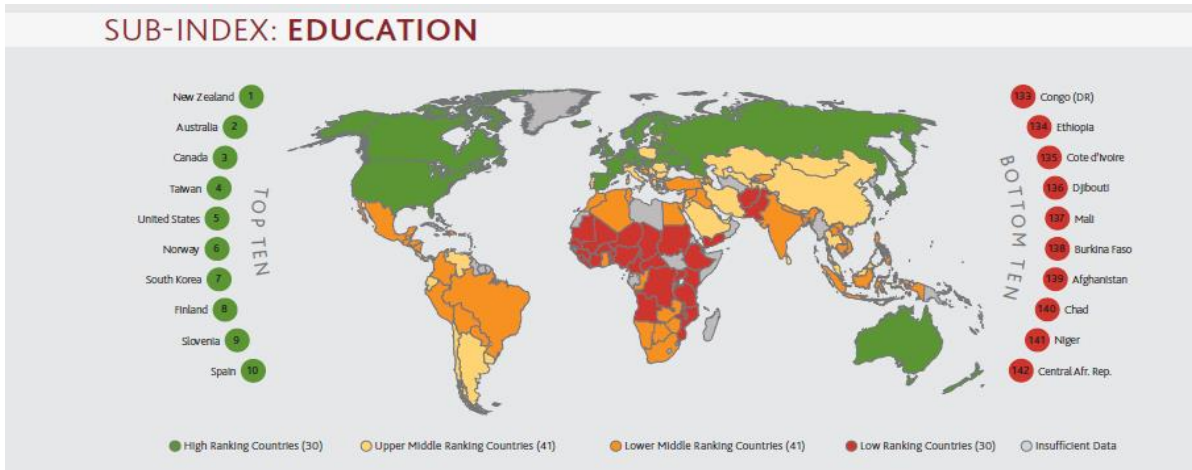


**Figure 3.5: Legatum Sub-Index: Governance**



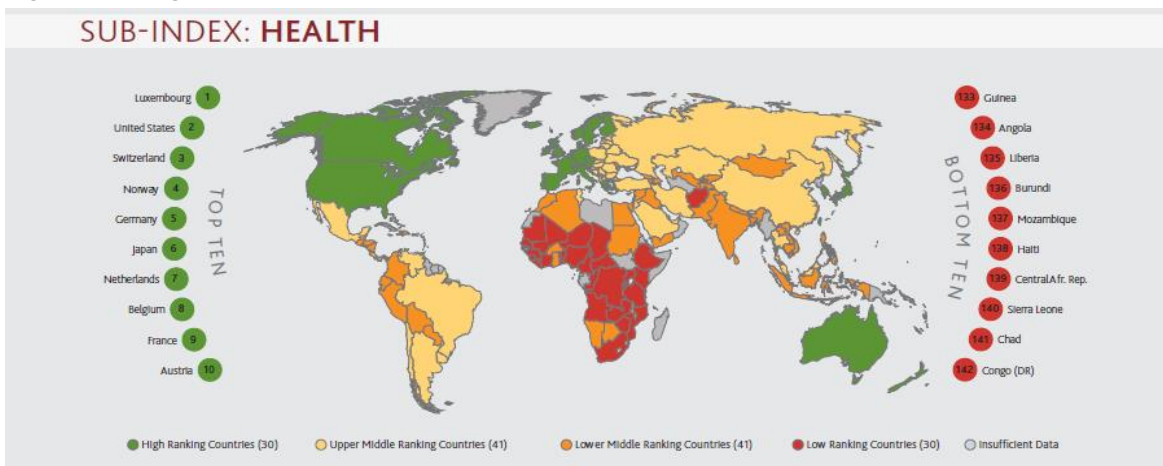
New Zealand 2<sup>nd</sup> in Governance

**Figure 3.6: Legatum Sub-Index: Education**

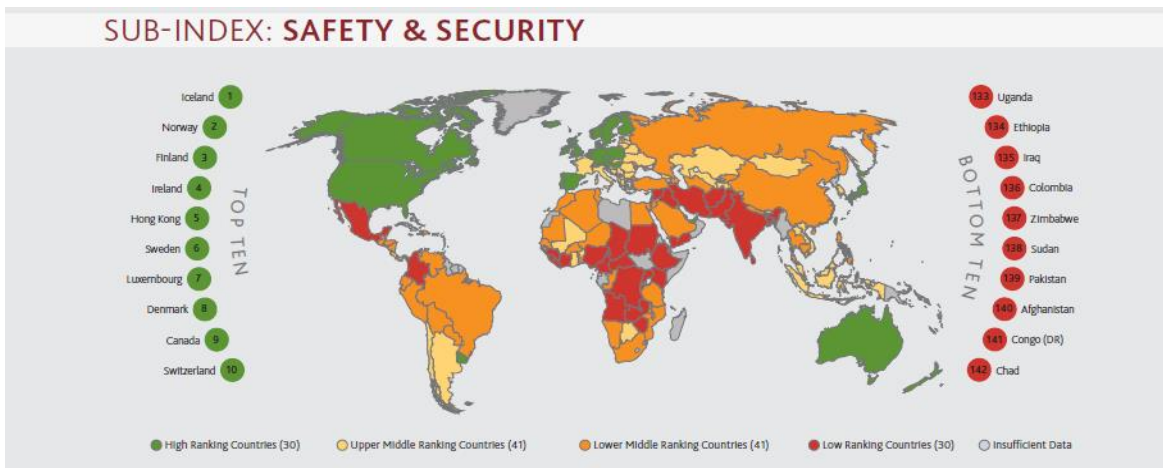


New Zealand First in Education

**Figure 3.7: Legatum Sub-Index: Health**

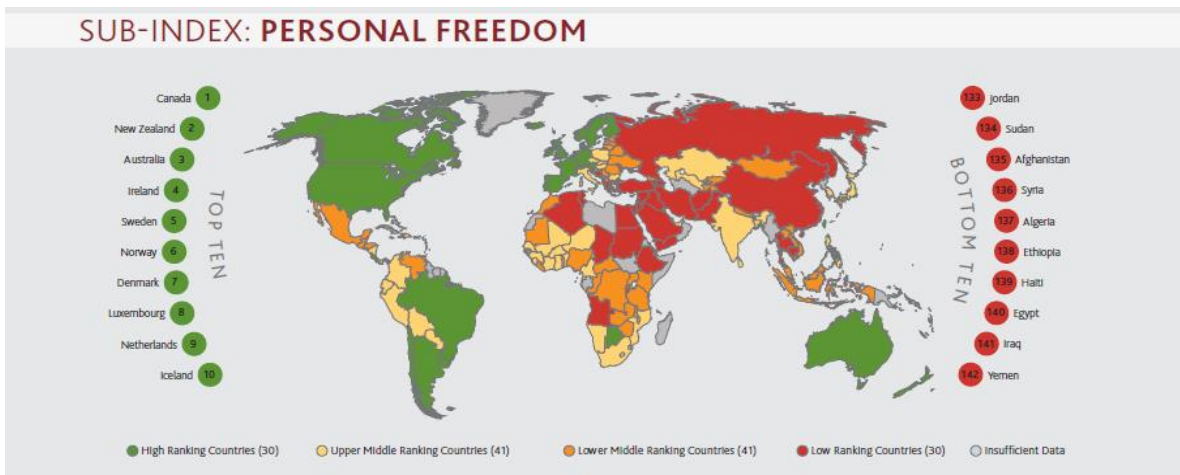


**Figure 3.8: Legatum Sub-Index: Safety & Security**



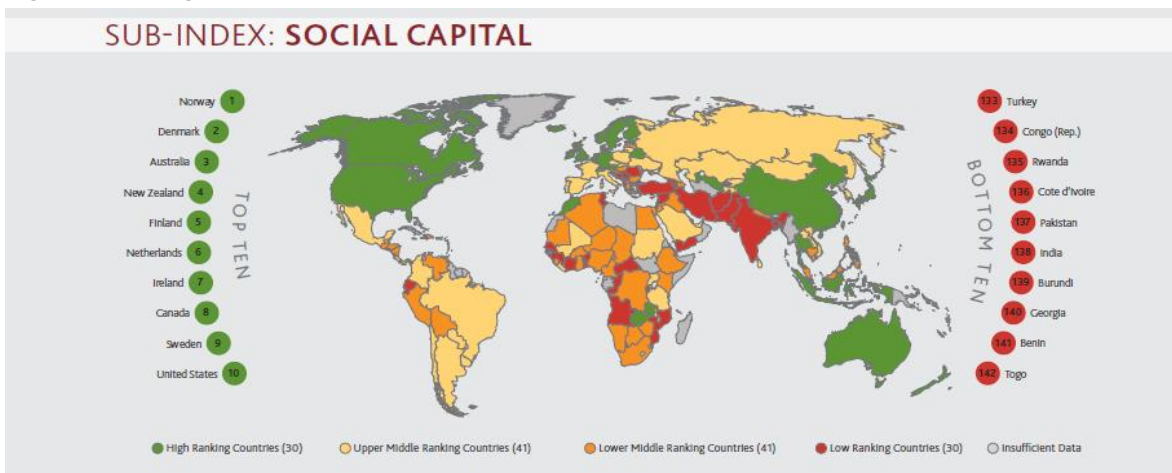


**Figure 3.9: Legatum Sub-Index: Personal Freedom**



New Zealand second in Personal Freedom

**Figure 3.10: Legatum Sub-Index: Social Capital**



New Zealand fourth in Social Capital

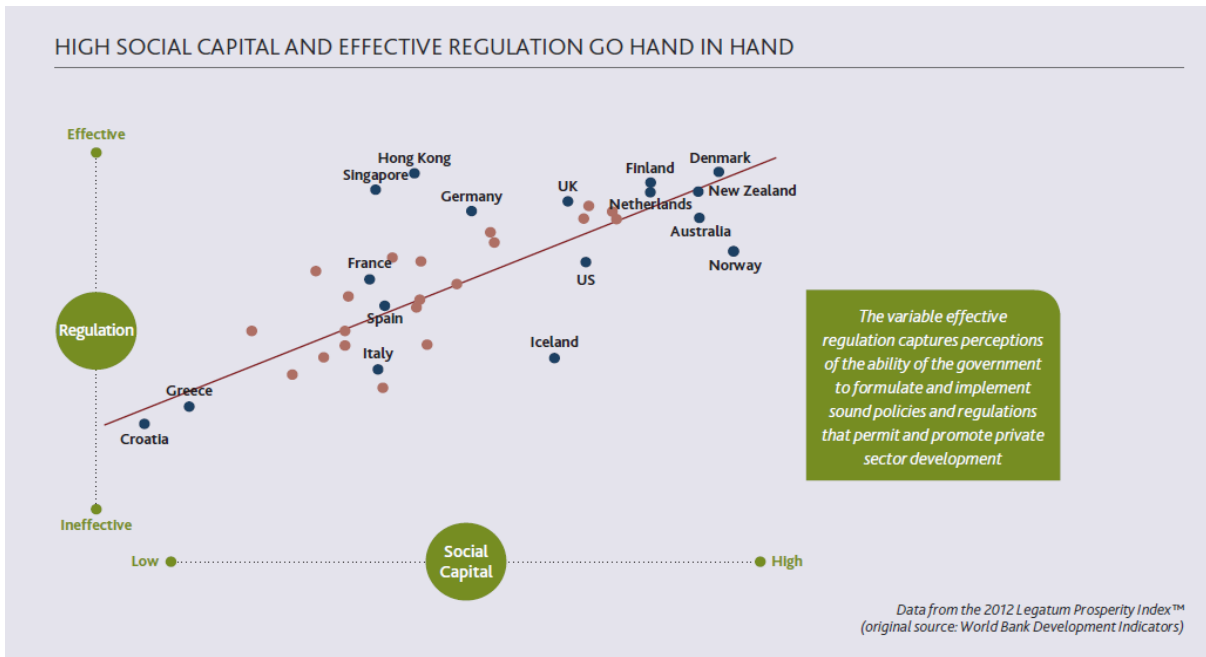
**Figure 3.11: Legatum Sub-Index Performers – Best and Worst**



Source: Legatum Institute  
Date: 2012

New Zealand is now keeping some exclusive company – Switzerland, Demark, Luxembourg, Iceland, Canada and Norway. It is inevitable that our infrastructure provision and expectations will also be compared with these peer countries.

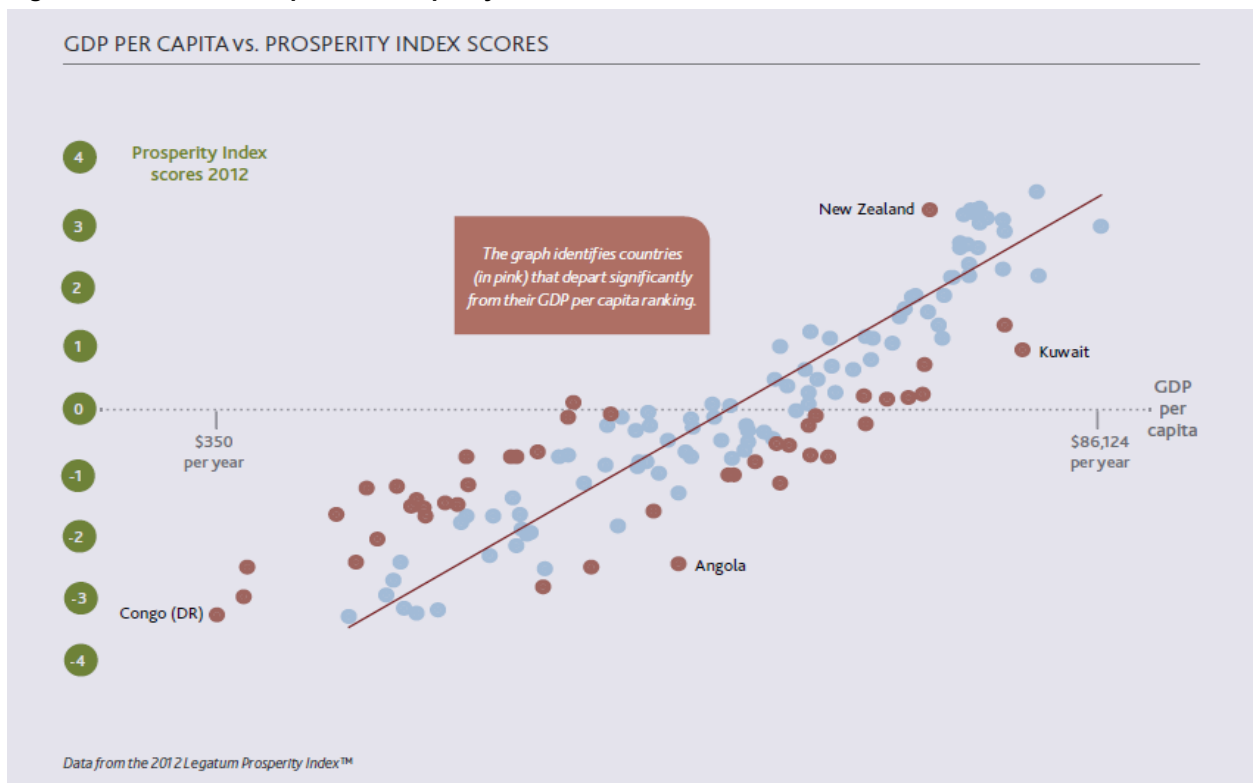
**Figure 3.12: High Social Capital and Effective Regulation Go Hand in Hand**



**Figure 3.13: High Social Capital and High Tolerance Go Hand in Hand**



Source: Legatum Institute Date: 2012

**Figure 3.14: GDP Per Capita VS Prosperity Index Scores**


Source: Legatum Institute  
Date: 2012

New Zealand – very high prosperity, but the economy is a little below the best in the world.

### 3.4 Additional Indicators

There are many other recent indicators of New Zealand doing very well by international comparisons. As a country New Zealand is often in the top 10 in the world. The list below is an additional sampling of recent indicators:

Global Human Freedom List – New Zealand = 1<sup>st</sup>

Source: *the New Zealand Herald*

[http://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=10858183](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10858183)

Date: 9 January 2013

The where-to-be-born index, 2013 – New Zealand = 7<sup>th</sup>

Source: *The Economist*

<http://www.economist.com/news/21566430-where-be-born-2013-lottery-life>

Date: 21 November 2013

Global Business Confidence – New Zealand = 10<sup>th</sup>

Source: *the National Business Review*

<http://www.nbr.co.nz/article/business-confidence-ranks-10th-highest-world-nq-134322>

Date: 2 January 2013

International City Quality of Life – Auckland = 3<sup>rd</sup>

Source: *the Stuff.co.nz website*

<http://www.stuff.co.nz/business/8037496/Auckland-third-best-for-quality-of-life>

Date: 5 December 2012

Forbes Best Countries for Business - New Zealand = 1<sup>st</sup>

Source: *Forbes*

<http://www.forbes.com/sites/kurtbadenhausen/2012/11/14/new-zealand-tops-list-of-the-best-countries-for-business/>

*Date: 14 November 2012*

Transparency International Corruption Perceptions Index 2012 – New Zealand = 1<sup>st</sup> Equal

*Source: Corruption Perceptions Index 2012 – Transparency International 2012 CPI Brochure.pdf*

*Date: 2012*

Instead Global Innovation Index 2012 – New Zealand = 13<sup>th</sup>

*Source: Instead – the Business School for the World GLL 2012 Report.pdf*

*Date: 2012*

### **3.5 Summary – New Zealand Doing Well**

New Zealand is doing exceptionally well compared to many other countries.

Resulting from this people will continue to migrate to New Zealand, and return to New Zealand from international destinations.

Growth assumptions for New Zealand will be limited politically by our immigration policy, not by the desire or availability of people to live here.

Much new infrastructure provision will be needed, particularly in Auckland over the next 30 years, and renewal and optimisation of infrastructure throughout the rest of the country.

New Zealand is one of the nicest places in the world to live, resulting from this infrastructure service expectations will continue to be high, and there will be sustained pressure for service levels to increase over time.

New Zealand will increasingly be compared with peer countries in the top 10 in the world. This comparison will cover education, health, public services and of course infrastructure provision.

## 4.0 FISCAL CHALLENGES AHEAD

### 4.1 New Zealand Fiscal Overview

Figure 4.1: NZ Fiscal Overview

(% of nominal GDP)	2010	2020	2030	2040	2050	2060	Δ
Health	6.9	6.9	7.9	9.1	10.1	11.1	4.1%
<b>Superannuation (NZS)</b>	<b>4.4</b>	<b>5.3</b>	<b>6.5</b>	<b>7.2</b>	<b>7.3</b>	<b>8.0</b>	<b>3.6%</b>
Education	6.2	5.2	5.1	5.1	5.1	5.2	-1.0%
<b>Other Op. Allow. Covered (e.g. Justice)</b>	<b>8.3</b>	<b>7.4</b>	<b>7.4</b>	<b>7.5</b>	<b>7.5</b>	<b>7.6</b>	<b>-0.7%</b>
Non-NZS Welfare	6.8	4.9	4.6	4.3	4.1	3.9	-2.9%
<b>Debt-financing costs (DFC)</b>	<b>1.2</b>	<b>1.9</b>	<b>2.6</b>	<b>4.3</b>	<b>7.1</b>	<b>11.4</b>	<b>10.2%</b>
<b>Total Expenses</b>	<b>33.9</b>	<b>31.6</b>	<b>34.1</b>	<b>37.5</b>	<b>41.2</b>	<b>47.2</b>	<b>13.4%</b>
Revenue (majority tax)	30.2	32.3	32.6	32.5	32.5	32.6	2.4%
Gap to Balance Budget	3.7	-0.7	1.6	5.0	8.7	14.7	10.9%
<b>Gap excluding DFC</b>	<b>2.5</b>	<b>-2.6</b>	<b>-1.0</b>	<b>0.8</b>	<b>1.7</b>	<b>3.2</b>	<b>0.8%</b>
<b>Core Crown Net Debt</b>	<b>14.1</b>	<b>30.8</b>	<b>42.3</b>	<b>73.8</b>	<b>125.3</b>	<b>203.8</b>	<b>189.7</b>

Source: NZ Treasury  
February 2013

There are fiscal tensions – but NZ in a much better place than many OECD economies, and we know about our problems, and they are manageable if we are prudent in the medium term.

It would be fair to say however, that there is not much fiscal headroom or fiscal room for mistakes in major public expenditure.

My estimate of total Infrastructure Expenditure is approximate 7% of GDP. This amount will certainly come under pressure after 2030, as Superannuation, Health and Debt Financing costs rise.

### 4.2 Local Authority Fiscal Challenges

New Zealand Local Authorities have been placed under increasing fiscal pressure since the start of the Global Financial Crisis.

Local Authorities finance infrastructure provision in a variety of ways:

- Land Tax (rates)
- Direct Fees (water meters, fees for services)
- Government Grants – particularly NZTA funding for Transportation
- Debt
- Development Charges
- Other fees and charges – which may include in a few occasions road tolls

All of these revenue sources are currently under fiscal pressure. This fiscal pressure is going to raise questions about the cost and sustainability of current service provision.

#### 4.2.1 Rates

Rates have been rising above general rates of inflation for the past decade. Much of this rise can be attributed to increasing infrastructure renewal requirements and costs.

The rises in rates are meeting the limits of national political acceptability. Within the past decade there have been government enquiries regarding rates, and legislation to constrain Council activities.

It is anticipated that fiscal pressure will remain on rates over the next 20 years, and therefore require more careful management of available resources – including infrastructure management.

#### 4.2.2 Local Authority Debt

In the early 2000's Local Authorities were encouraged to leverage their balance sheets with prudent use of debt. This has been facilitated by generally low interest rates over the last decade.

Council debt levels have now risen close to prudent limits, especially when considered on a debt per ratepayer level. Larry Mitchell ([larry@kauriglen.co.nz](mailto:larry@kauriglen.co.nz)) has done extensive analysis of this issue. Larry has analysis available for every local authority – some of it makes grim reading.

The Average Debt per Ratepayer summary is listed below.

**Figure 4.2: Average Debt per Ratepayer**

Average Debt per Ratepayer (\$)					
Group	2008	2009	2010	2011	2012
<b>Metro Group Stats</b>	5,172	6,507	7,407	8,477	9,273
<b>City Group Stats</b>	3,976	1,413	4,605	4,758	5,173
<b>Prov/Rural Group Stats</b>	2,338	2,772	3,174	3,430	3,811
<b>Rural Group Stats</b>	1,873	2,124	2,136	2,430	2,475
<b>Total of all Groups Stats</b>	2,642	3,055	3,391	3,706	4,026
<b>Total of all Groups Stats (including Auckland)</b>	2,681	3,112	3,441	3,834	4,176

Source: Larry Mitchell, Local Government League Table March 2013

In summarising local authority debt concerns we can note the following:

- 2002 \$1500 acceptable debt, \$3000 max
- Inflation adjust to 2013 \$2000 acceptable, \$3900 max
- Current Average Debt \$4000 but interest rates are lower – for now. Metro/City higher debt

Given the already higher levels of debt, many local authorities will struggle to use increasing debt to fund infrastructure.

Resulting from this it is expected that fiscal pressure will increase on debt levels over the next few years, which will continue to constrain availability of funding for infrastructure.

Infrastructure Managers need to engage in this conversation as this constraint will impact on the maintenance of service levels, renewal and provision of new infrastructure.

#### 4.2.3 Government Grants

As the New Zealand Government continues to react to the fiscal pressures it is under, and try's to balance overall taxation, and government debt there will be continuing fiscal pressure on transfers to Local Authorities.

This is already showing up in changes to NZTA funding to Local Authorities, and it is expected that this will continue over the next two decades. The population shift north and associated transport pressures will only increase the size of this problem for the other areas.

It is expected that fiscal pressure will remain on Government Grants for the next 20 years.

#### **4.2.4 Development Contributions**

Political pressure is also coming on the level of Development Contributions. Local Authorities will increasingly have to justify the level of Development Contributions, and the New Zealand try's to free up land, and decrease the cost of housing (particularly in Auckland) – development contribution funding may be unilaterally overridden for political reasons.

Like all other Local Authority funding sources Development Contributions will remain under fiscal pressure for the foreseeable future.

#### **4.3 Summary of Fiscal Challenges**

All Local Authority funding sources are likely to be under significant fiscal pressure for the period through to 2030. This fiscal pressure is already showing in many areas – rates, debt levels, government transfers, development contributions.

There are significant fiscal challenges at a national level. They are manageable with sustained prudent policy, but there is very little economic room for additional expenditure.

These sustained fiscal pressures will impact on local authority revenue levels. Subsequent to this the fiscal pressures will also translate into pressure on local authority expenditure, particularly on infrastructure.

It is expected that this fiscal pressure will be sustained throughout the next 17 years to 2030 and beyond, and will be the normal environment for infrastructure management during this period.





## 5.0 POPULATION AND DEMOGRAPHY

### 5.1 New Zealand is Changing Quickly

New Zealand's population is changing quickly. The decades long trend of population movement north and the cities is increasing, with population in the provincial areas predicted to remain relatively static. Demographically, New Zealand has passed a demographic tipping point, with very little (short of massive immigration) to be done to change the trends. All reasonable forecasting must now factor in the effects of this demographic change on New Zealand.

The population and demographic changes will have inevitable effects on the provision of infrastructure and service levels associated with infrastructure.

### 5.2 Population Changes

Figure 5.1: Population Changes

Region	2006 Population	2031 Projected Population	Projected Increase	% Increase	Growth Driver
Northland	152,700	171,300	18,600	12.2	Static
Auckland	1,371,000	1,944,700	573,700	41.8	Growth
Waikato	395,100	468,200	73,100	18.5	Growth
Bay of Plenty	265,300	323,400	58,100	21.9	Growth
Gisborne	46,000	45,900	-100	-0.2	Decline
Hawkes Bay	152,100	158,300	6,200	4.1	Static
Taranaki	107,300	108,500	1,300	1.1	Static
Manawatu	229,400	236,900	7,600	3.3	Static
Wellington	466,300	541,200	75,000	16.1	Growth
Nelson	45,800	53,200	7,400	16.2	Static
Tasman	44,300	49,900	5,600	12.6	Static
Marlborough	43,600	48,700	5,200	11.7	Static
Westcoast	32,100	31,300	-800	-2.5	Decline
Canterbury	540,000	652,400	112,400	20.8	Growth
Otago	199,800	225,900	26,100	13.1	Static
Southland	93,200	87,900	-5,800	-5.7	Decline
<b>Totals</b>	<b>4,184,000</b>	<b>5,147,700</b>	<b>963,700</b>	<b>23.0</b>	<b>Growth</b>

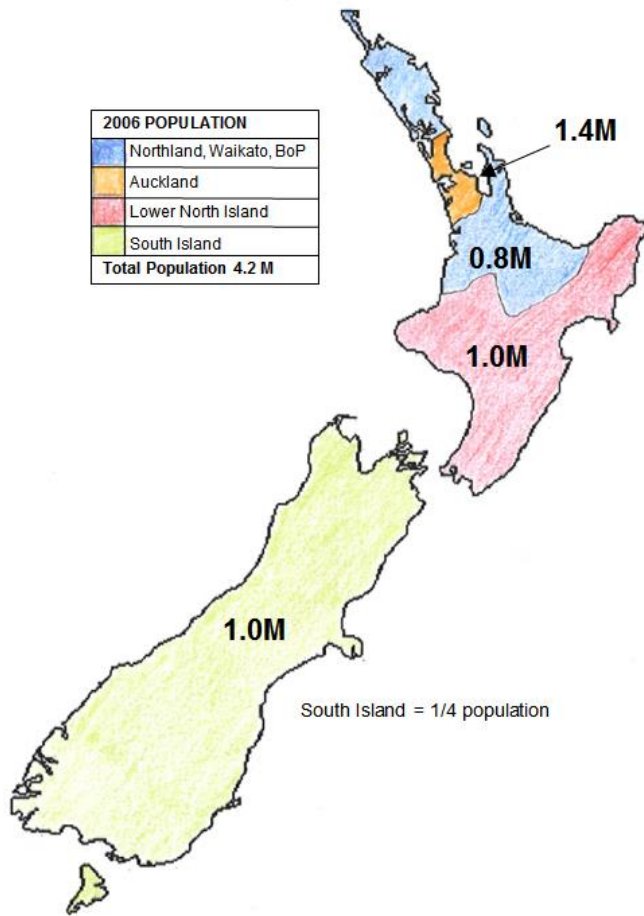
Source: National Infrastructure Plan

Date: 2011

2006 Census actuals versus 2030 projections. This year's census will provide a very important update, especially with regard to Christchurch and Canterbury generally. Auckland, Bay of Plenty and Canterbury are projected to grow numerically.

Auckland is the major driver of growth, and this will create a range of profound infrastructure challenges for New Zealand, as increasingly resources are committed to Auckland to maintain service levels during a period of sustained growth.

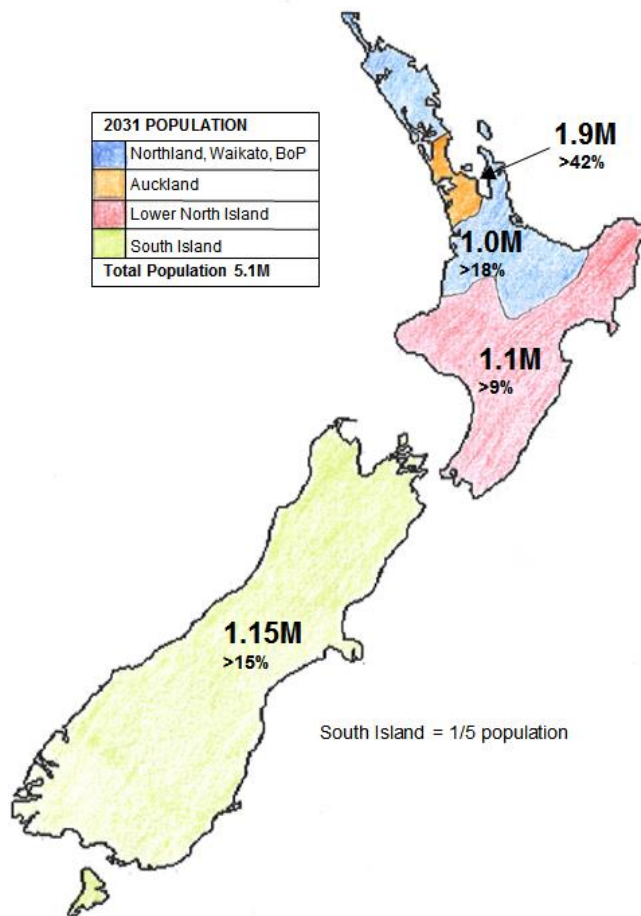
**Figure 5.2: Map of New Zealand 2006 Population**



Source: National Infrastructure Plan  
Date: 2011

2006 Census results:

- South Island ¼ of population
- Lower North Island ¼ of population
- Waikato, Bay of Plenty and Northland – just under ¼ of population
- Auckland – just over ¼ of population

**Figure 5.3: Map of New Zealand 2031 Population Projected Growth**


Source: National Infrastructure Plan  
Date: 2011

The projected growth to 2030 translates as shown. South Island currently  $\frac{1}{4}$  of population in 2030 projected to be  $\frac{1}{5}$  of population. This will have political and infrastructure capital expenditure implications – as new capital will generally follow growth.

The underlying issue below this total population analysis – demographic change, which will have as much or even more impact.

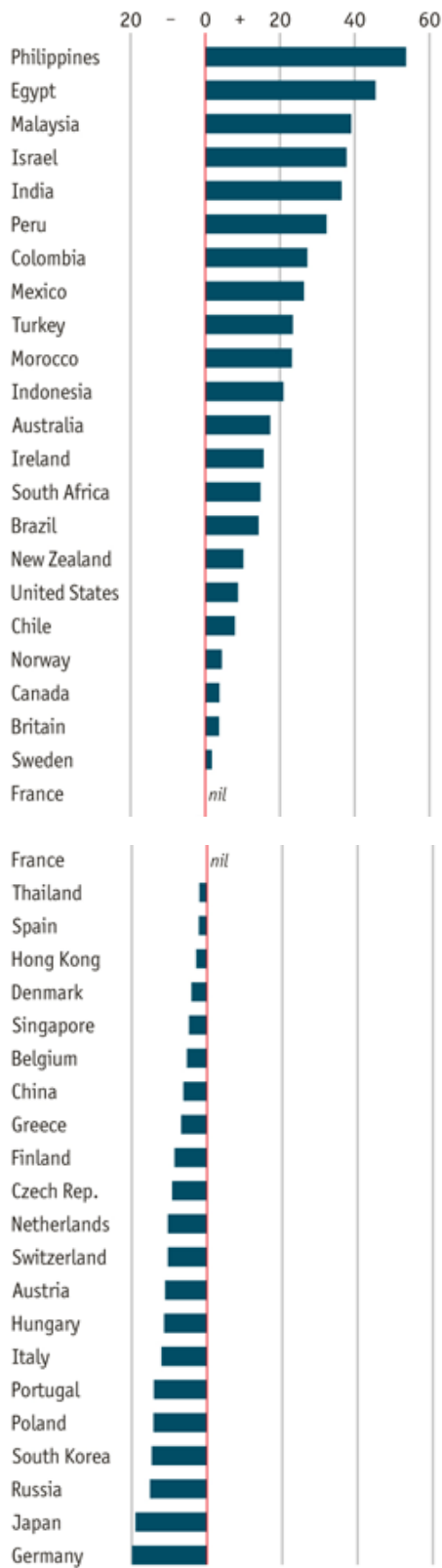
### 5.3 Working Age Population Changes

#### Working-age population\*

2010-35, % change

New Zealand is doing better than many other Western countries in terms of working age population, which is attributable to the dynamics of our post World War Two baby boom – relatively larger, and longer than many others. The impacts of working age population change (declining, leading to skills shortages in many Western countries) can be observed in Europe and Japan before the New Zealand impact. This will hopefully allow us to modify policies and adjust to the inevitable changes. New Zealand's working age population is projected to start declining within the next 30 years.

**Figure 5.4: Working Age Population**



Sources: UN Population Division; *The Economist* \*Persons aged 15-64

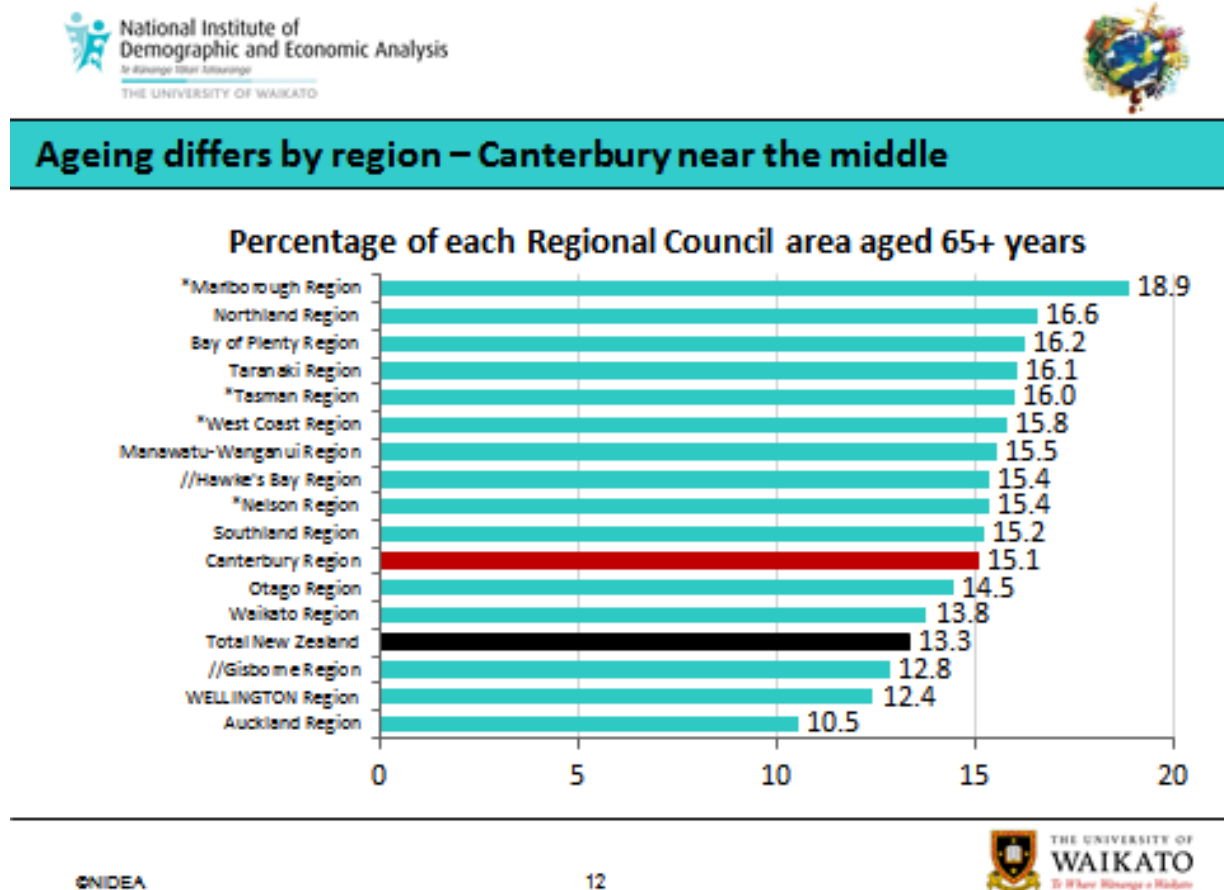
Source: *The Economist* – UN Population  
Date: 2012

Currently NZ also doing well compared to 'old Europe', China, Russia and Japan in working age population projections

## 5.4 Demographic Changes

The following data and slides have been provided by Professor Natalie Jackson of the National Institute of Demographic and Economic Analysis (University of Waikato) for a workshop held in Timaru with Canterbury attendees in February 2013. The observations are relevant for all of New Zealand. The Timaru observations are relevant to any New Zealand provincial town.

Figure 5.5: Demographic Changes (6 slides)



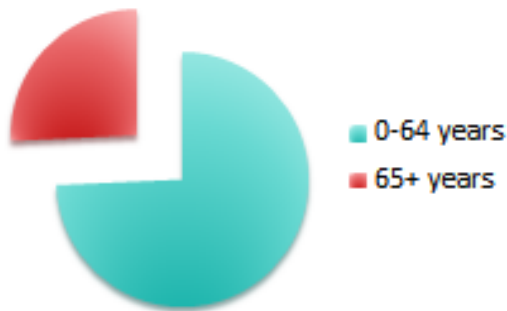
Source Professor Natalie Jackson, NIDEA, February 2013



## Most of Canterbury's growth will be at 65+ years

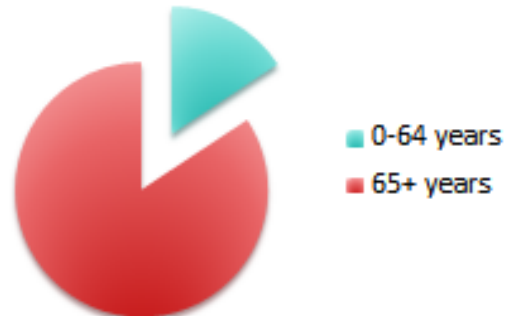
**1996-2011**

Canterbury



**2011-2031**

Canterbury



Source Professor Natalie Jackson, NIDEA, February 2013

When looking at the national growth projections to 2030 it is important to remember that most of the growth will be 65+ year old growth.

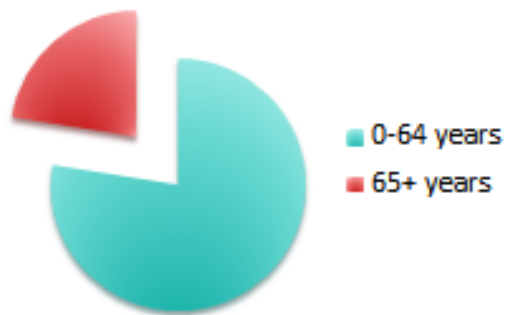
This is a complete change from earlier growth patterns, which would generally been thought of as families and young children. There are impacts across education, social policy, health provision and local authority infrastructure.



**Projected contribution to growth by age - Christchurch**

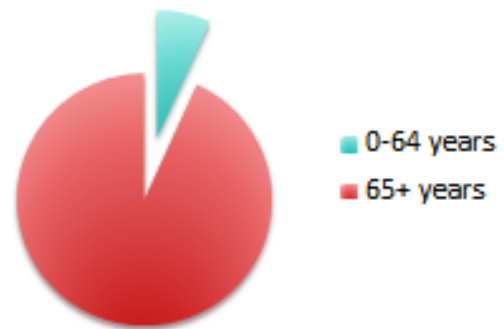
**1996-2011**

**Christchurch**



**2011-2031**

**Christchurch**

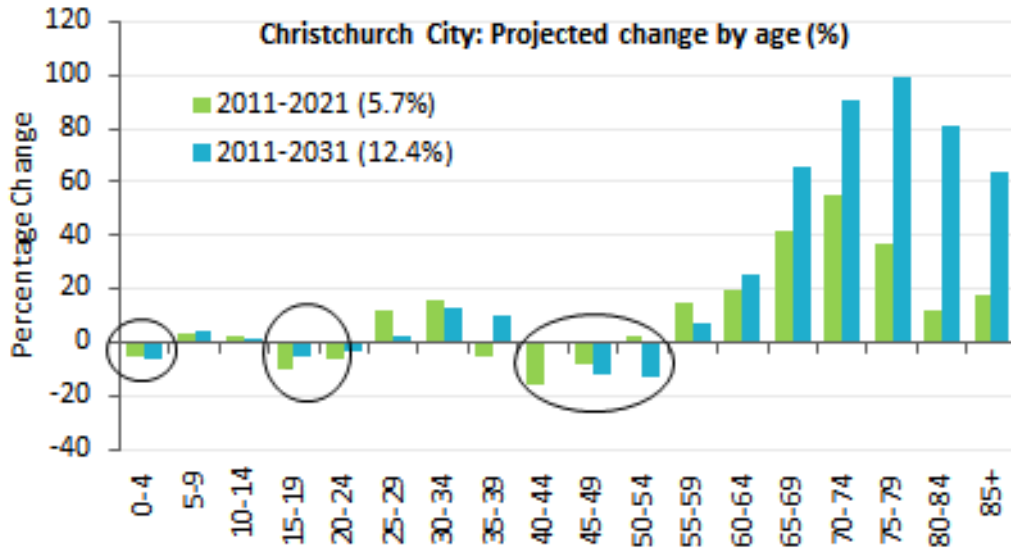


Source Professor Natalie Jackson, NIDEA, February 2013

These impacts show in Christchurch as well as Canterbury as a whole.



**the jury is still out, but growth is likely to be ageing-driven**



Statistics New Zealand Subnational Population Projections by Age and Sex, 2005(base)-2031 (2012 Update)

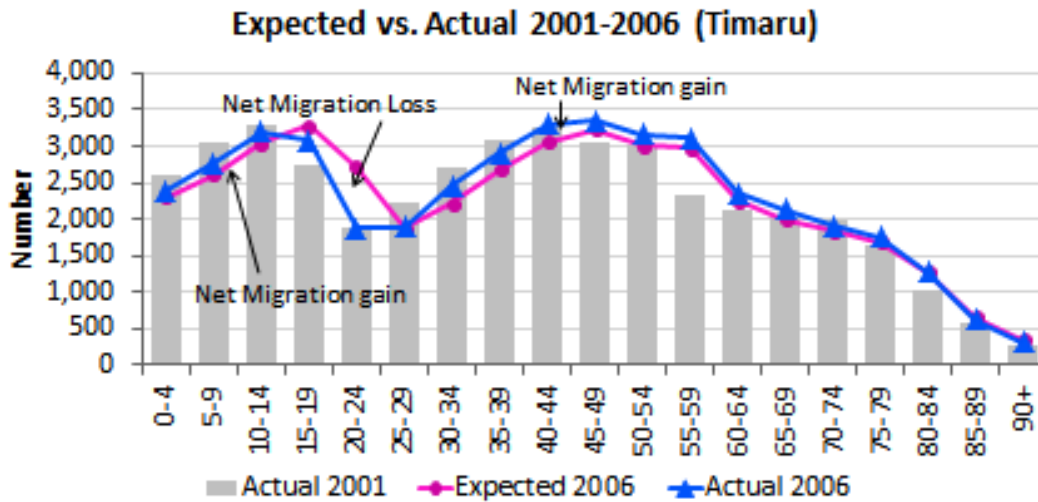
Source Professor Natalie Jackson, NIDEA, February 2013

Note – for Christchurch the aftermath of the Earthquakes may change these dynamics slightly. The long term trends are in place.





**Timaru - classic net loss at young adult ages, minor family gains (?)**

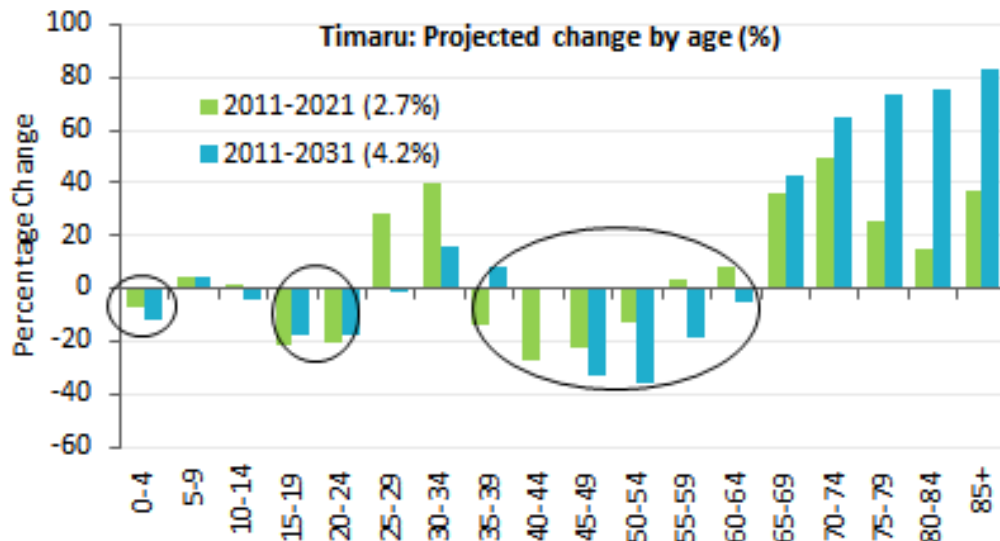


Source Professor Natalie Jackson, NIDEA, February 2013

This pattern is typical of Provincial New Zealand where 18-30 year olds leave to study, develop careers, and travel.



**Timaru – all projected growth at 65+ years, net loss most other ages**



Statistics New Zealand Subnational Population Projections by Age and Sex, 2006(base)-2031 (2012 Update)

©NIDEA

17



Source Professor Natalie Jackson, NIDEA, February 2013

Again typical of provincial New Zealand. High growth in the 65+ population is expected to 2031 and beyond. This will impact on Local Authority service provision, and the expectation of services, and changes to services.

### 5.5 Summary of the Impact of Population and Demographic Changes

New Zealand's population and demographic changes can be summarised as follows:

- New Zealand's population is growing, and will continue to grow
- This growth is predominately in the upper North Island and Auckland
- A demographic tipping point has been crossed
- Much of the growth will be 65+ population
- This will be particularly noticeable in provincial areas
- This will lead to a range of issues
  - Skills shortages
  - Availability of working age populations
  - Changes in Education, Welfare and Health services required
  - Changes in Infrastructure Services required
- The changes will be profound – we can look to Europe, parts of North America and Japan to observe the effects ahead of when they impact New Zealand
- New Zealand's working age population will decline in the next 30 years

## 6.0 NATIONAL INFRASTRUCTURE TRENDS AND ISSUES

### 6.1 National Infrastructure Plan

New Zealand is still a young country in world terms, and as such much of our infrastructure is still developing.

The National Infrastructure Plan <http://www.infrastructure.govt.nz/plan/2011> points to the need for sustained and changing infrastructure investment across all infrastructure sectors in New Zealand.

New Zealand is currently spending well above the OCED average (as a % of GDP) on infrastructure – primarily because New Zealand is still developing as a country.

This level of expenditure is expected to remain high for the next decade and longer, but come under increasing pressure as the fiscal pressures build in the New Zealand economy towards 2030.

It is probable that some of the current new capital projects identified in Council Long Term Plans and the government expenditure signalled in National Infrastructure Plan will struggle to attract funding.

### 6.2 New Zealand Still Developing Infrastructure

Figure 6.1: New Zealand Still Developing Infrastructure

	NZ	Scotland	Ireland	Finland	Norway	Denmark
Land Area (sq. km)	268,680	78,352	70,289	304,473	307,442	42,394
Population (m) 2009 est.	4.3	5.2	4.4	5.3	4.6	5.5
Population (m) of largest city 2009 est.	1.4	1.2	1.6	1.3	0.6	1.8
Railways (km) 2006	4,128	2,745	1,919	5,919	4,114	2,667
Roads (km) 2006	93,576	55,838	96,602	78,821	92,946	72,362
Expressways (km)	171	1160	200	700	664	1032
If additional Expressways to 2030+	552					
Transport Ranking (IMD)	31	24 (UK)	35	7		4

Source: NZCID, *Insights for NZ – Infrastructure Development in Comparative Nations*, Date: October 2010

We are behind our peers, and there is still plenty to do, especially with regard to Expressway construction.

### 6.3 Transportation Capital Expenditure Impacts

Figure 6.2: Current Roads of National Significance Construction

RON Name	Length (km)	2009 Est. in \$B	\$M/km
Puhoi to Wellsford	38		
Waterford Connection		2	
Auckland Victoria Park	0.44	0.43	
Waikato Expressway	102	1.9	20
Tauranga Eastern Corridor			
Wellington Northern Corridor	110		
Christchurch Motorway Projects			
<b>Totals</b>	250.44	10.5	20

Source: NZTA Road Maintenance Task Force Better Asset Management, Planning and Delivery  
Date: 13 March 2012

As part of the work Waugh Infrastructure completed in the Road Maintenance Taskforce 'Better Asset Management' report, we identified possible future Roads of National Significance. This was completed to demonstrate the need for a sustained new capital work programme, at about current levels, and also building new roads at higher standards and service levels creates a higher maintenance commitment. This analysis showed that there will be pressure on transportation funding to meet all these needs though to 2030 and beyond. **It should be stressed that this was Waugh Infrastructures own assessment, and this in no way reflects any current or future Government policy or commitment in this area.**

Figure 6.3: Possible Future Roads of National Significance

RON Name	Length (km)	2009 Est. in \$B	\$M/km
Hamilton to Tauranga (SH1, SH29)	75	1.9	25
Cambridge to Taupo (SH1)	100	2.5	25
Additional Auckland	40	3.2	80
Napier – Hastings	20	0.6	30
Levin to Palmerston North	47	1.2	25
Christchurch SH1 Expressways	60	1.2	20
<b>Total</b>	342	10.6	

Source: NZTA Road Maintenance Task Force Better Asset Management, Planning and Delivery  
Date: 13 March 2012

**Figure 6.4: Map of Possible Future Roads of National Significance**


Source: NZTA Road Maintenance Task Force Better Asset Management, Planning and Delivery  
Date: 13 March 2012

One likely impact of population growth change – our projections from the Road Maintenance Taskforce AM Research Report – likely State Highway major capital projects through to 2030. Not Govt. policy – another 10-15 billion after current RoN programme (approx. 1 bn per year). South Island – only Christchurch RON programmes will be funded.

**Figure 6.5: Expressway Construction – 1956 – 2040 (Projected)**

Construction Period	# Years	Expressway constructed km	Average Km/year	Comments
1956 - 2006	50	171	3.42	Urban
2006 – 2016	10	39 (planned)	3.9	Mix
2016 – 2040	24	342 (projected)	14.25	Mainly rural

Source: NZTA Road Maintenance Task Force Better Asset Management, Planning and Delivery  
Date: 13 March 2012

## 6.4 New Infrastructure has to be the right infrastructure, built to the right standard, in the right place

New Zealand has no fiscal headroom in the next 20 years for any mistakes in the provision of infrastructure – not in new capital, not in renewals, and not in operations and maintenance.

Simply put New Zealand has to build the right infrastructure, to the right standard, in the right place.

This requirement is made more difficult by the impacts of reasonably rapidly changing population and demographics.

The following Sections were presented in my paper to the 2010 Ingenium Conference – but bear repeating given the subject of this current paper.

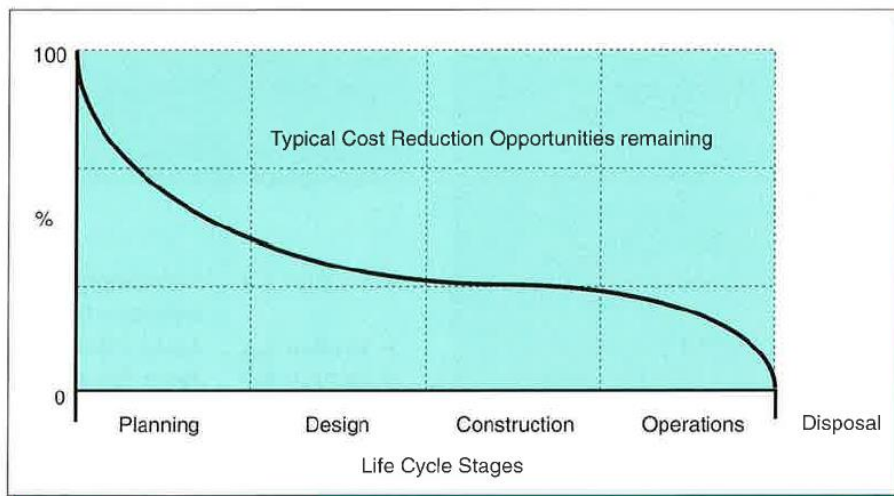
### 6.4.1 Cost Reduction Opportunities in Construction of Infrastructure

Construction of assets with long lives requires careful consideration of lifecycle costs, demand for the assets, and willingness of the asset users to pay the lifecycle costs.

The greatest ability to influence these lifecycle costs of any asset is at the planning and design phases of the asset. Similarly the planning, design and construction cost is a major lifecycle cost.

This is shown in the following figures drawn from industry manuals.

**Figure 6.6: Typical Cost Reduction Opportunities Remaining**

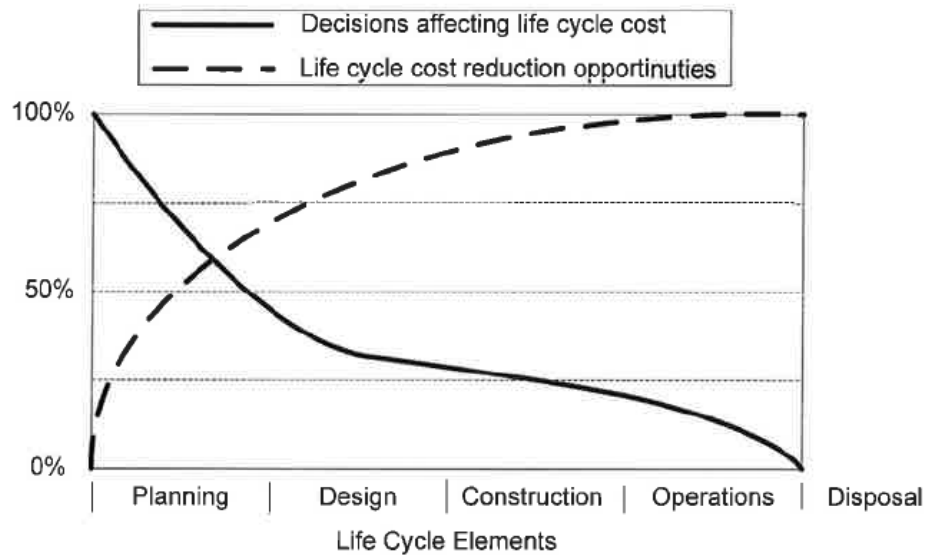


*Figure 2.1.3: Lifecycle Cost Reduction Opportunities*

Source: NZ Infrastructure Asset Management Manual, 1996

Figure 6.7: Lifecycle Cost Reduction Opportunities

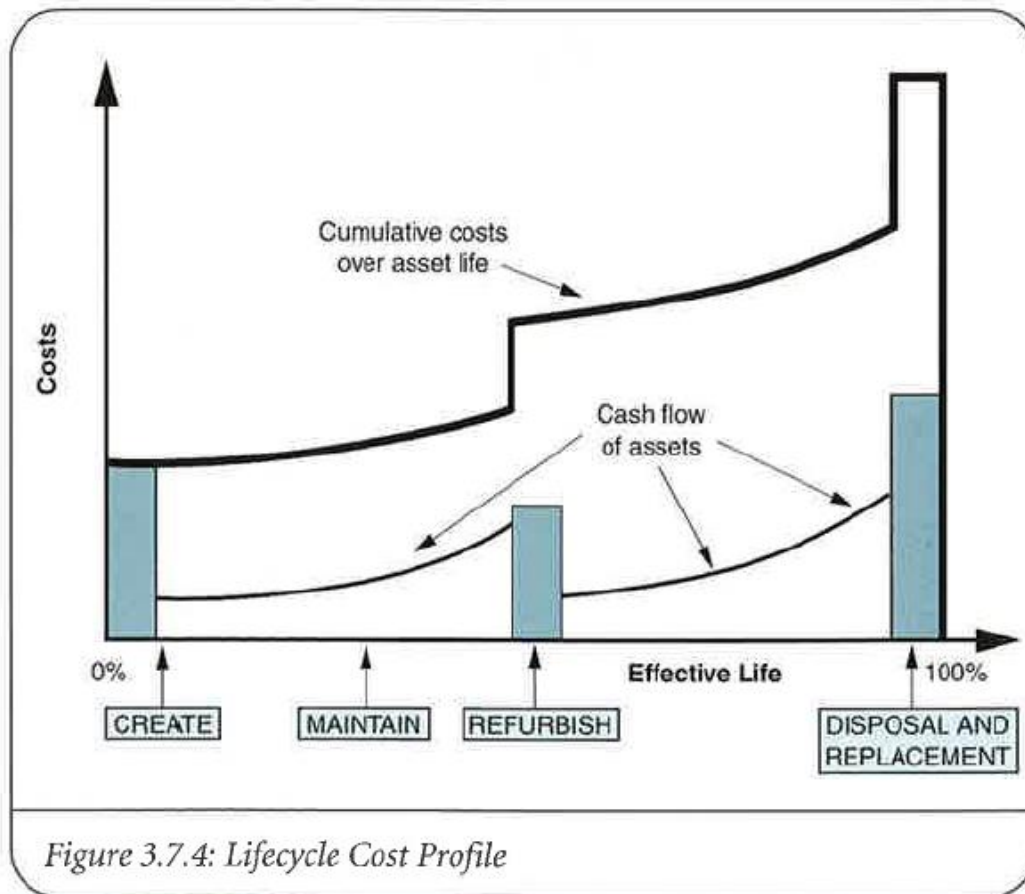
*Fig 4.1: Life Cycle Cost Reduction Opportunities*



Source: IPWEA, 1999, *National Asset Management Manual*, Fig 3.1.3.1, p 3.6

Source: *Australian Infrastructure Financial Management Guidelines*, 2009

**Figure 6.8: Lifecycle Cost Profile**



Source: *International Infrastructure Management Manual, 2006*

**Figure 6.9: Lifecycle Cost Profile (2)**

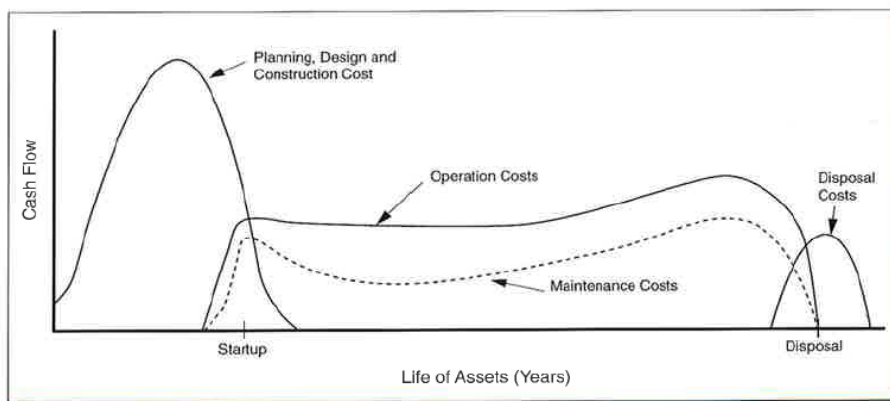


Figure 4.7.1: Lifecycle Cost Profile

Source: *NZ Infrastructure Asset Management Manual, 1996*



#### **6.4.2 Infrastructure Management Guidance Conclusion**

A great deal of care needs to be given to the planning and design phase to ensure that the lifecycle costs of the infrastructure being considered are optimised. The care required does not suggest rushed, simplistic or reactive solutions.

### **6.5 Summary of National Infrastructure Trends and Issues**

New Zealand needs continued and sustained investment in infrastructure throughout the next 20-30 years, as signalled in the National Infrastructure Plan.

This level of expenditure will come under increasing pressure as the fiscal pressures build in the New Zealand economy towards 2030.

It is probable that some of the current new capital projects identified in Council Long Term Plans and the government expenditure signalled in National Infrastructure Plan will struggle to attract funding.

New Zealand is behind peer countries in Expressway construction, and it is the opinion of this author that the construction will continue at or just below current levels throughout the next 20-30 years. This predicted construction means the current pressures on transportation funding (capital and maintenance) will remain for the entire period.

New Zealand has no fiscal headroom in the next 20 years for any mistakes in the provision of infrastructure – not in new capital, not in renewals, and not in operations and maintenance. Simply put New Zealand has to build the right infrastructure, to the right standard, in the right place. This requirement is made more difficult by the impacts of reasonably rapidly changing population and demographics.

This requirement will mean there will be higher needs for infrastructure management, design optimisation, and building the right assets to the right standards. These are the expectations of our society on Infrastructure Managers and Engineers.



## 7.0 FUTURE IMPLICATIONS – CITY AND DISTRICT PLANNING

### 7.1 Changes in Cities and Towns

New Zealand towns and cities are likely to face major changes in their structure and form over the next 30 years as the impacts of the 65+ growth, sustained immigration, and changing expectations from this play out in New Zealand society.

These issues are being discussed in Planning Forums, but it is uncertain that these discussions are translating into infrastructure discussions.

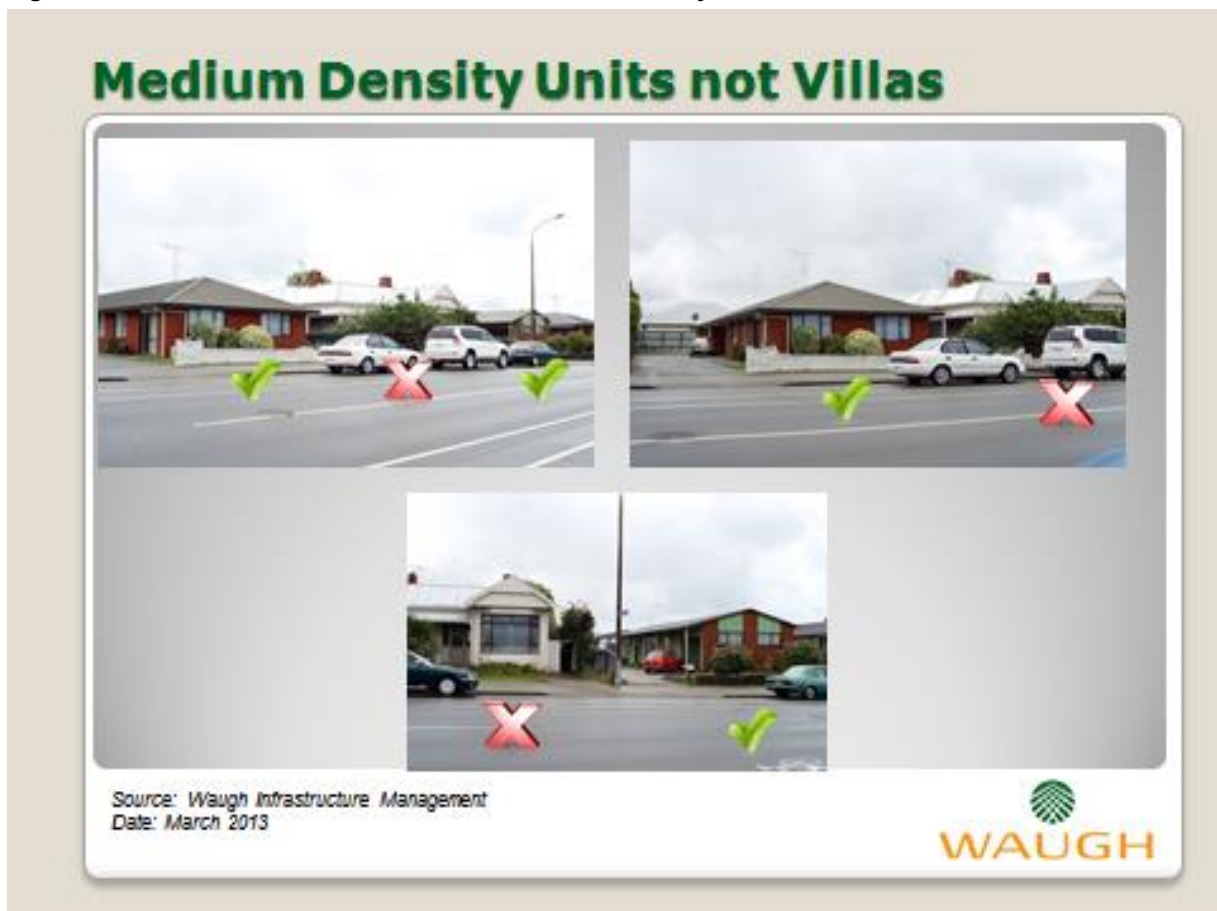
It is also uncertain if our current City and District Plans and planning laws sufficiently allow for the changes that are coming.

Some of the changes are relatively easy to predict, and are canvassed below as they demonstrate potential infrastructure impacts.

### 7.2 Intensification to Town Centres

New Zealand towns and cities will almost certainly consolidate back towards the centres, with medium density units clustering closer to major services such as health facilities, recreational facilities, and other amenities. This trend is already underway, and can be observed in most towns and cities in New Zealand. It is likely over time that Villa's and Bungalows will be replaced by more and more medium density units, as the space / cost of living requirements of the growing 65+ population also contract. This will also include more use of apartment living.

Figure 7.1: Intensification to Town Centres – Medium Density Units not Villas

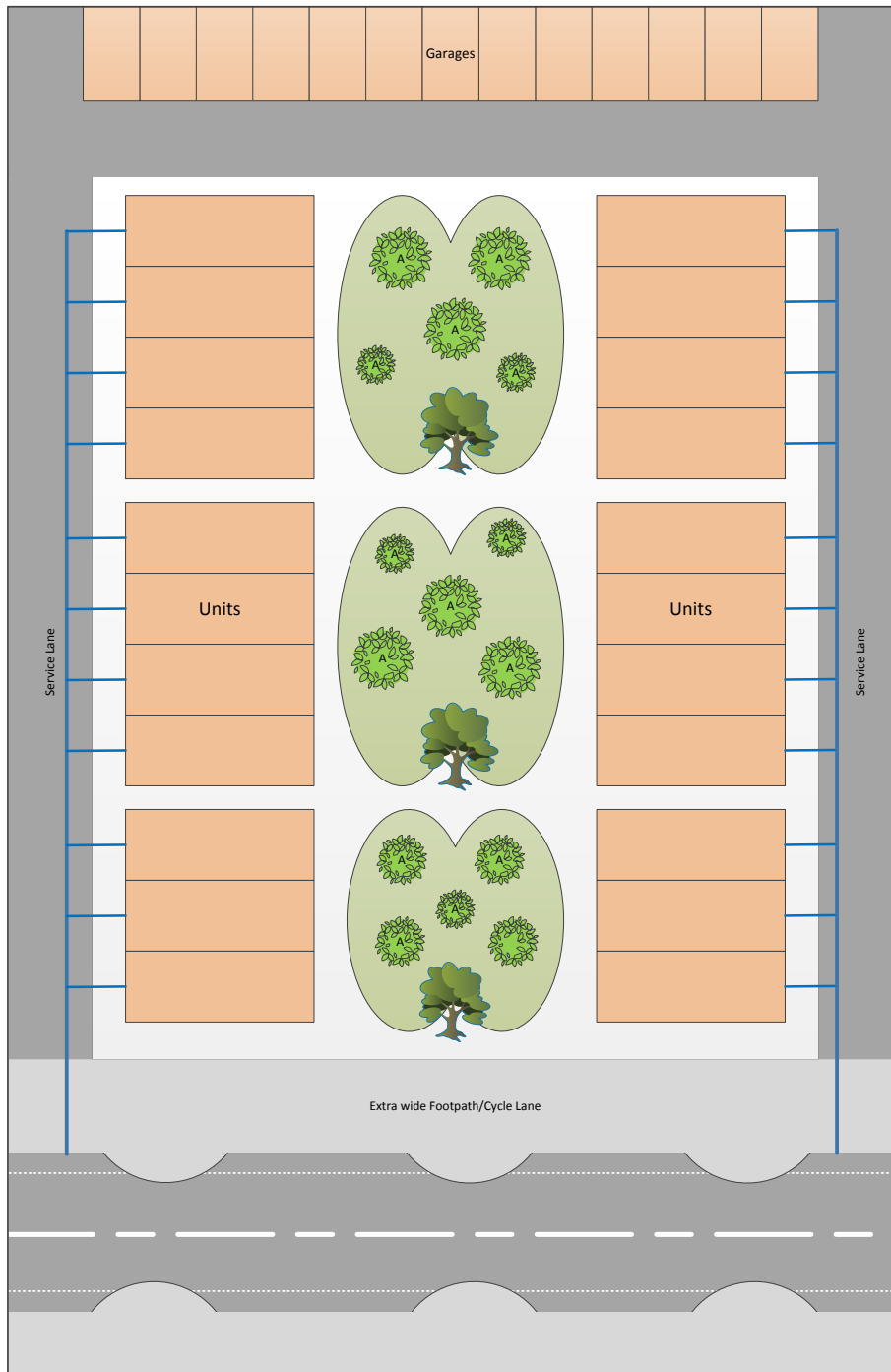


Source: Waugh Infrastructure Management  
Date: March 2013

### 7.3 New Development Layouts

The development of more ‘village green’ or ‘village common’ type medium density housing is highly likely. A possible example layout is shown below. These types of layouts are already being trailed by Housing New Zealand and others, and this trend looks set to increase. These types of development layouts have the potential to have large impacts on the provision of infrastructure services – transportation, water service / fire fighting, refuse collection, stormwater drainage (using the common area for storage or soakage for example). These layouts will need to be accommodated in Planning Documents, Engineering Codes of Practice, Low Impact Urban Design Practice, Engineering Standards, Fire Code of Practice and thinking about the renewal, and re-provisioning of infrastructure.

**Figure 7.2: New Development Layouts**



Source: Waugh Infrastructure Management  
Date: March 2013

#### Design Parameters and Potential Infrastructure Changes:

- Multiple Units per site
- Central common green
- Rear narrow service lanes
- Garaging / Storage at rear
- Less cars, smaller cars
- More scooters
- More bicycles, cycle lanes requirements
- Wider footpaths
- Traffic calming, narrower carriageway
- More public transport
- 2<sup>nd</sup> tier rental car for market to 65+ persons

## 7.4 Town Abandonment

Figure 7.3: Town Abandonment



*Altena lies in the rugged hills south of Dortmund in the western German state of North Rhine-Westphalia. From 32,000 residents in the early 1970s, only about 18,000 remain. With declining birth-rates, high mortality and younger families moving to cities, many residents in Altena wonder whether their town will survive at all.*

Source: <http://www.spiegel.de/international/germany/volunteers-help-save-germany-s-shrinking-towns-a-880352.html>

In Germany, Holland, and parts of the USA towns are being effectively abandoned. Economic and demographic changes are causing this.

In New Zealand we are behind these areas in the impact of the changes, but they are coming.

Abandoning towns is not something we like to discuss, and politically it is very difficult given our national myths and narratives. We have abandoned towns in New Zealand in the past following resource booms, and no doubt we will abandon some of them in the future.

The question from an infrastructure management viewpoint is when. We are creating high quality infrastructure with 50 – 100 year + lives, but some of this money is wasted if this infrastructure provision is made in a town that will be abandoned in this period. Conversely of course, if no updated infrastructure provision is made then it hastens the demise of the town.

There are no easy answers to this; however as an industry we do need to start discussing these issues. Managing decline is much harder than managing growth – to serve our communities well and sustainably we need to be able to do both.

## **7.5 Infrastructure Master Plans**

In many countries Infrastructure Master Plans are used to guide and plan growth and infrastructure development. They are not unknown in New Zealand – in the 1970's the Ministry of Works maintained master plans (particularly around highway development) for our major cities and then used these to guide land designation and acquisition.

With the predicted changes in urban form that are developing as a result of growth and demographic changes it is suggested that the usefulness of infrastructure master planning be re-examined to guide infrastructure development.

If you don't know where to start ask your staff that have come from South Africa or Asia as master planning is commonly practiced in these areas.

Napier City Council has developed over the years their Essential Services Plans, which are very close to Infrastructure Master Plans and are well worth considering as a model.

## **8.0 FUTURE IMPLICATIONS – TRANSPORTATION**

### **8.1 Funding Shifts**

Funding shifts from NZTA are already happening and will continue to happen. The 'One Network' approach will account for some of this, more analysis of asset management planning and requirements, and also the inevitable shift of funding to the upper North Island and Auckland as the growth increases pressure on the network.

If you manage outside these areas it is highly likely your funding will be constrained or reduced over the next 20 years.

### **8.2 Funded Service Levels based in Hierarchy**

With the determination and publication of road hierarchy based on the 'One Network' approach, I think it is highly likely that for each hierarchy a set of service levels will be established, and then funding will be matched to the maintenance of the determined service levels. Any higher service levels will have to be locally funded without subsidy. It will be interesting to see what actually eventuates.

### **8.3 More Differentiation of Service Levels**

It is also likely that in rural and provincial areas there will be more differentiation of service levels, and it is possible the some roads will be maintained to four wheel drive access only standards. There are isolated examples of this now, with potential for further implementation due to the fiscal constraints.

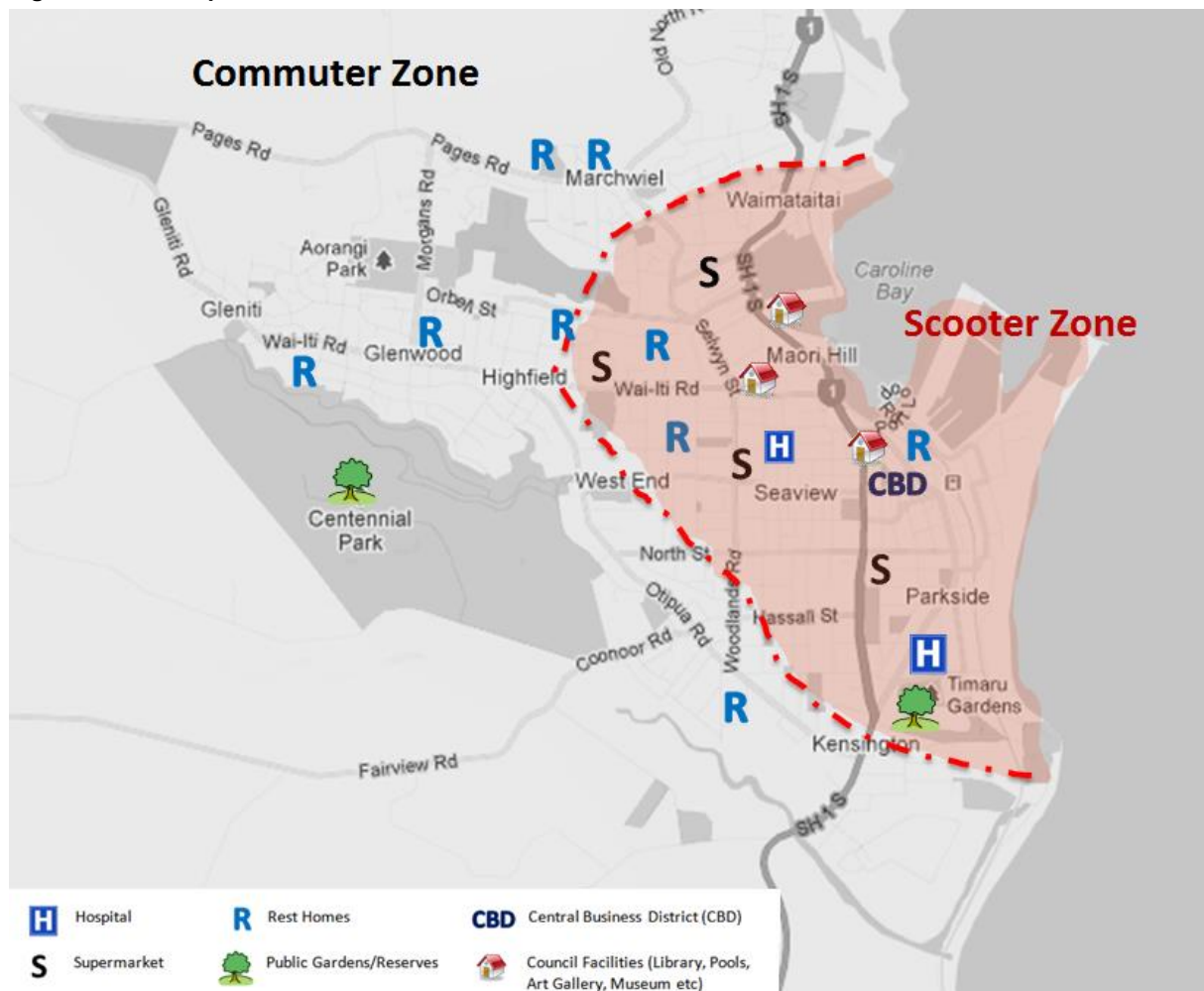
### **8.4 Different Urban Forms**

Tied to the 65+ year growth and our rapidly changing population demographic there will be changes in urban form. This is already starting to occur, and will need to be better planned and coordinated. The is potentially high impact on road width, provision of separated cycle lanes, wider footpaths to accommodate scooters and changing forms of kerb and gutter, and corner crossings.

### **8.5 Scooter Zones and Commuter Zones**

The establishment of 'Scooter Zones' is likely in urban and infrastructure planning where there is medium density housing, wider footpaths, more recreation areas, separated cycle ways and traffic calming. These zones are likely to be cluster around health and other facilities. Timaru has been used as an example of how these zones might establish and be developed.

Figure 8.1: Transportation Scooter and Commuter Zones



Source: Waugh Infrastructure Management  
 Date: March 2013

### 8.6 Less Cars, More Cycling, More Walking, More Scooters, More Public Transport

As the 65+ population grows, and slowly clusters around major services in the ‘Scooter Zones’ there are likely to be a number of secondary effects that will have impacts on the provision of transportation networks and services:

- People will have more time so are more likely to walk or cycle especially if they are relatively close to amenities – they will want to be safe in doing this
- This is likely to drive demand for better, wider, safer footpaths and cycleways. Retired residents have much more time to agitate – ask Kapiti Coast DC or Nelson CC if you are in any doubt about this
- More mobility scooter use will also lead to demand for wider, smoother footpaths. So will more people with restricted mobility
- There will likely be more demand for public transport – restricted incomes and more time makes this more likely
- Less cars – if you are close to amenities then do you need a car – maybe only a very small one? Second tier hiring or the growth of services like ‘Driving Miss Daisy’ or San Francisco’s Uber <https://www.uber.com> will fill the gap – are you planning for more cycles, pedestrians and scooter, and less cars



- More emphasis on traffic calming and lower urban speeds. This is already occurring in many places in New Zealand and will only increase

## 8.7 Heavy Transport Growth

With the New Zealand population increasing to over 5 Million and with our agriculture continuing to intensify there will inevitably be growth in heavy transport. Is your network ready, and do you know the trends and the implication of those trends?

## 8.8 Engineering Resilience

Resulting from the lessons of the Christchurch Earthquakes there will be a requirement for more / better network resilience. These requirements will need to be built into your network and infrastructure planning.

## 8.9 Not Business as Usual – Prepare for the Change

Managing transportation networks will not be business as usual. There are multiple trends for change in urban and rural networks, and real potential to build assets that will not be required, or required in different forms in the foreseeable future. Thought needs to be given to the potential impacts of these changes, and the impacts on your asset acquisition, renewal and maintenance

## 8.10 More Modelling Needed

As fiscal constraints increase, and funding is shifted to growth and higher need areas, there will be an increasing requirement for modelling of scenarios, network deterioration and changing dynamics. The modelling will be needed to demonstrate the need for expenditure and the risks and consequences of different scenarios. As increasingly difficult trade-offs need to be made, good modelling will assist in business case development, and regional / national perspectives on resource and funding allocation.

## 8.11 Summary for Transportation

### 8.11.1 Urban Networks

- Councils sources of revenue constrained for the next 10 years +
- Not all currently identified capital projects funded?
- Less funding for network maintenance
- Scooter Zone Changes
- More emphasis on cycleways, footpaths, clustering services in urban villages, public transport
- Changes in thinking, planning and AM required
- Specified service levels funded at different hierarchy levels?
- More need for modeling of effects dTIMS, RAMM
- More need for expenditure optimisation

### 8.11.2 Rural Networks

- Councils sources of revenue constrained for the next 10 years +
- Not all currently identified capital projects funded?
- Less funding for network maintenance
- More hierarchy differentiation
- Specified service levels funded at different hierarchy levels?
- Changing land use adds twist
- More need for modeling of effects dTIMS, RAMM
- More need for expenditure optimisation



## **9.0 FUTURE IMPLICATIONS - UTILITIES**

### **9.1 Renewals Peak in Next 30 Years**

During the post-World War Two development boom from the 1950's to early 1970's a significant amount of New Zealand's pipe utility infrastructure was built out. For Water and Wastewater networks much of this was using Asbestos Cement Pipe with an expected useful life of 60 – 90 years.

The period 2030 – 2050 is predicted in almost all Utilities Asset Management Plans I have seen to be the major peak in utilities renewals. This is 17 short years away, with early pipe failures now becoming apparent.

Whilst much utilities management attention in the past decade has been meeting the requirement of renewed consents and legislated potable water quality improvements, management effort will now need to be more directed towards pipe renewal requirements.

### **9.2 Funding the Renewals Peak – Fiscal Constraints**

The utilities renewals funding peak will occur at the same time as the national fiscal constraints will require difficult political decisions and trade-offs. The peak also occurs at the tail end of the baby-boom retirement when the percentage of 65+ will be rapidly increasing.

There will be major fiscal constraints in New Zealand society during this period. The question of whether enough revenue has been collected/saved and/or enough debt facility is available to fund the renewals peak needs to be answered. Engineers need to engage in this discussion.

### **9.3 Changing Urban Forms – impact on services**

The possible changes in urban form and the intensification of town centres that have been discussed in this paper will have impacts on the provision of utilities services. Policies will need to be adapted and change.

Engagement will need to be had with District/City/Regional Planners and Transportation Engineers around the areas and potential impact of intensification.

There is potential impact on fire servicing – discussions and planning will be needed around this.

It is likely that there will be parts of your network where you will not replace like with like due to the changes in urban form – have you modelled this, and are you prepared for it?

### **9.4 Water Competition – Urban versus Intensifying Agriculture**

The recent Land and Water Forum, National Infrastructure Plan and other Government work have highlighted the increasing competition for water resources between urban uses and intensifying agricultural requirements. These water resource issues are already leading to increasing requirements for demand management, leakage control etc. This is expected to increase throughout the next 20 years, and require additional modelling, resource and management.

### **9.5 Engineering Resilience**

Resulting from the lessons of the Christchurch Earthquakes there will be a requirement for more / better network resilience. These requirements will need to be built into your network and infrastructure planning.

## 9.6 The Search for Efficiency

The search for further efficiency in the delivery of utility services across New Zealand has led to an on-going discussion on the best structures and forms of entity to meet our community requirements.

This discussion is on-going, and healthy. It will inevitably lead to changes in service delivery structures and mechanisms. These potential industry structure changes will not change the underlying dynamic of the need for good and sustained utility infrastructure management.

## 9.7 Public Health Engineering – the Cost of Crossing the Line

Approximately every 10 years New Zealand has had a system failure that has led to a public health event. Whilst these events are relatively far and few between they do highlight the fact that water and wastewater utilities management is at its core public health engineering.

When the line gets crossed there are real and sometimes lifelong effects associated with the failure. In extreme cases fatalities can occur.

As fiscal and management pressure develops around utilities expenditure the underlying public health engineering practices and issues need to be balanced against this.

## 9.8 More Modelling Needed

As fiscal constraints increase there will be an increasing requirement for modelling of scenarios, network deterioration and changing dynamics. The modelling will be needed to demonstrate the need for expenditure and the risks and consequences of different scenarios. This modelling will need to include analysis of failure risks, and public health impacts.

As increasingly difficult trade-offs need to be made, good modelling will assist in business case development, and local / regional / national perspectives on resource and funding allocation.

## **10.0 FUTURE IMPLICATIONS PARKS AND PROPERTY**

### **10.1 Changing Urban Forms**

The predicted changing urban forms and rapid growth of the 65+ population will mean more demand for green space, passive and active recreation facilities, and other community facilities.

These may not necessarily be required in the form currently provided, and it is expected there will be significant shifts in required service levels, required service provision, and the assets required to meet these requirements.

### **10.2 More Demand for Recreational Assets**

With a much larger 65+ population there will almost certainly be a much higher demand for recreational assets. It is also highly likely that this same group will want discounts and special privileges for the use of these assets – they will want high levels of service, and they will not want to pay for the service.

This is of course nothing new in the community assets space, but the problem is likely to get worse, and the impacts higher – as there are more assets that are used more.

### **10.3 Natural Hazards Resilience and Refits**

Resulting from the lessons of the Christchurch Earthquakes there will be a requirement for more / better public building resilience. New standards will be determined, and then applied to Council facility and property assets. Much of the preliminary assessment and work on this has already commenced around New Zealand, and will continue through the next decade.

### **10.4 Constrained Fiscal Environment for the whole Period – how to fund**

As anyone working in Community Assets management knows transportation and utilities get the bulk of the available money. In the predicted fiscal restraint for the next 20 years, there will be real and sustained pressure on Community Assets budgets.

This pressure will come at a time when there are higher demands for service, rapid changes in asset use and requirements, and higher asset usage.

Reconciling these issues is going to be an on-going and major issue for Community Assets Managers.

### **10.5 Green space and Community Assets - More use of Volunteers?**

With a much higher proportion of the population retired or semi-retired but still fit and active it is likely that one of the mechanisms to manage the fiscal pressure, provide higher levels of service and reduce costs will be much higher use of volunteer staff.

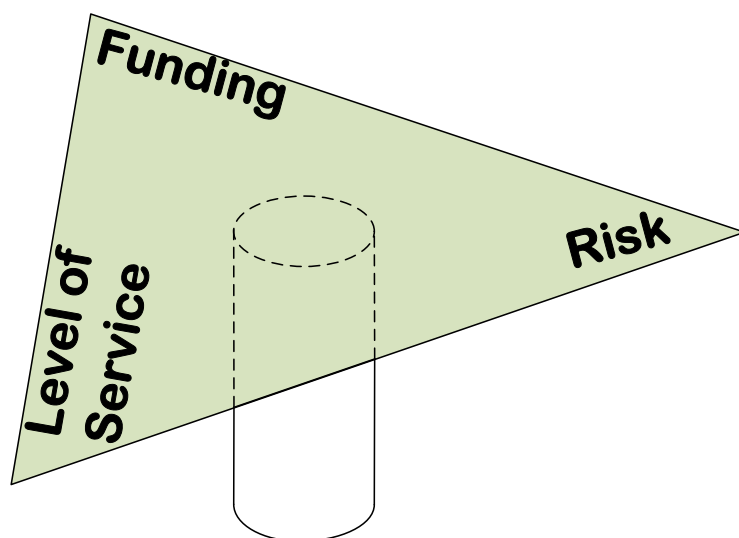
This is already seen in libraries and museums where there is use of volunteers to extend opening hours and provide support to employed staff. It is likely this will extend to a much wider range of services including operations and maintenance services.

It is acknowledged that much wider use of volunteers will bring a raft of contractual, employment, training, skilling, safety and insurance issues. These can be overcome with careful preparation and planning. Is your organisation thinking of or discussing this likely trend?



## 11.0 RESOLVING THE BUDGET – LEVEL OF SERVICE – RISK TRIANGLE

Figure 11.1: Risk Triangle



Source: Waugh Infrastructure  
Date: March 2013

In the development of the Road Maintenance Task Force Asset Management Report Grant Holland and I referred to the Budget – Level of Service – Risk triangle.

It is clear to us that these three items need to be considered together, especially when budgets are being decreased. We see this Triangle as a balanced platform as shown in the diagram.

When funding is increased, it is likely levels of service increase and risk decreases.

Conversely – when funding is decreased it is likely that levels of service will also decrease (over time) and risk increases.

Our impression, having worked all over New Zealand, it that our industries work on this is only beginning, and that as an industry we do not have a particularly good take on the trade-offs and consequences – certainly not in detail. In discussions around the country we know that Auckland Transport has initiated work in this area – but it is early days.

As you begin to think about this issue the following ideas may be useful:

- Levels of Service – thinking of Levels of Service occurring in bands
  - Where is the top of the band?
  - Where is the bottom of the band?
  - Where is your current service provision in the band?
  - At what point do your customers, users, consumers notice a difference in the band (this assists in defining the top and bottom of the band)?
- Budget – Fiscal Restraint. This is going to occur so at what point do budget reductions
  - Affect service levels?
  - Make no economic sense (higher cost of maintenance than renewal)?
  - Change you from one service level band to another?
- What happens to Risk
  - It is hidden until it affects you
  - What is acceptable risk to you, your community, and your governance decision makers?
  - Do you know what the risks are?
  - Can you quantify the risks?
  - Have you advised your governance decision makers of the changed risk profile?

## 11.1 Managing the Trade-offs

Managing the Budget – Level of Service - Risk Triangle is all about managing trade-offs. Do you have a decision model or framework that assists you to do this in a consistent way?

## 11.2 Modelling the Issues

The issues and trade-offs associated with the Budget – Level of Service – Risk Triangle require modelling of the issues and likely scenarios. Our understanding is that this modelling is only just starting in New Zealand asset management practice.

## 11.3 Providing Advice to Governance – Multiple Scenario Analysis

Current Asset Management Plans generally only provide one or sometimes two expenditure scenarios (although there are exceptions to this).

As Governance Decision Makers grapple with increasingly difficult trade-offs between:

- Community desires for service provision and service levels (generally high)
- Community willingness to pay (generally lower)
- The risks associated with constrained expenditure

They are going to require good models that provide the ability to analyse multiple scenarios, adjust results, and see the impact on budget, service levels and risk.



## 12.0 SKILLS SHORTAGES – DOING MORE WITH LESS

### 12.1 Global Engineering Skills Shortage

It is well documented that there is a global shortage of skilled Engineers. In New Zealand this shows up in Engineering being one of the professions on the skill migrant list.

Whilst we have established that New Zealand is a very desirable place to live, we are a relatively low wage economy, competing in a global marketplace.

New Zealand attracting and retaining skilled Engineers is going to be a challenge throughout the next 20-30 year period. The New Zealand Government has recently recognised this by increasing funding to the Engineering Schools at New Zealand Universities and increasing Engineering placements. This however will not address the whole issue.

We are going to have to continue to become adept at doing more with less skilled resources. Managing the inherent risks associated with this trend is going to be interesting.

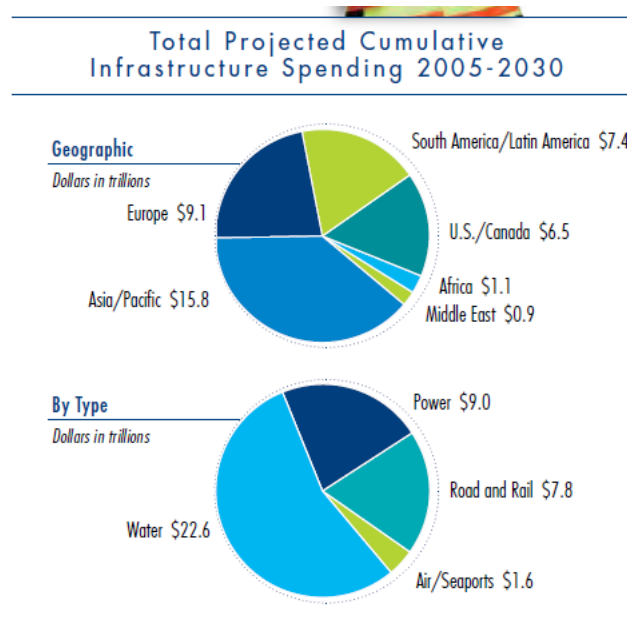
### 12.2 Engineers Like Building Stuff, Not Managing Decreasing Budgets

Many Engineers join the profession because they enjoy using their skills to build major infrastructure to assist communities. In a world where Booz Allen predicts there will be USD \$41 Trillion spent on public infrastructure between 2005 and 2030 there are going to be plenty of opportunities for Engineers to be involved in projects and build infrastructure. \$15.8 trillion of this Expenditure is projected to be in the Asian /Pacific Region.

The next 20 years is a fantastic time to be involved in the profession.

What is of concern is that New Zealand authorities managing tight fiscal conditions, demand for increased services, and effectively static or decreasing budgets are going to be competing for Engineering resources in a world that is undertaking major infrastructure building projects. When attracting Engineers to come to, or stay in New Zealand this is going to be an issue.

**Figure 12.1: Total Projected Cumulative Infrastructure Spending 2005-2030**



Source: Booz Allen Hamilton, Global Infrastructure Partners, World Energy Outlook, Organization for Economic Co-operation and Development (OECD), Boeing, Drewry Shipping Consultants, U.S. Department of Transportation

### **12.3 Australia Likes New Zealand Engineers (and they are short of Engineers too)**

If you have ever been to an IPWEA Conference in the past decade you will be well aware that there is a large and looming shortage of Public Works Engineers in Australia. For New Zealand Engineers Australia can be a very attractive place to work, and I am sure we all know colleagues who have moved to work there.

The proposed joining with IPWEA being brought to this conference is just another recognition that there is a trans-Tasman job market for Engineers, and Engineering organisations.

We can expect continued movement of skilled Engineers from New Zealand to Australia and this will continue to impact the New Zealand Engineering skills shortage.

### **12.4 Boom and Busts Don't Work for Authorities or their Professional Service Providers**

Given that we have been feeling the effects of the Global Financial Crisis for about 5 years now it is natural there has been expenditure constraint across the New Zealand economy.

In an Engineering Resource constrained world booms and busts are not particularly helpful to retaining resources in particular areas. We are already seeing another impact of this with the significant relocation of Engineering Resources to Christchurch.

If you are not in Auckland or Christchurch, it is time to start thinking about how you will procure and retain the long term engineering resources needed in your area. It is an issue, and it is already becoming apparent in provincial New Zealand. Major consultancies have been rationalising offices and resource levels, and for Councils experienced staff are becoming harder to attract to provincial areas.

### **12.5 Where will the help come from?**

It is likely that New Zealand will continue to attract Engineering immigrants from the UK, Ireland, South Africa, and Asia. This has been a trend for several decades now. Competition for these migrants is growing, and New Zealand needs to continue to monitor the effectiveness of our efforts in the international marketplace.

The increased training of our own Engineers is vital and current efforts to attract young New Zealanders into the engineering profession need to increase.

### **12.6 Engineering Skills Shortage could well be the major Infrastructure Management Constraint**

One of the questions that infrastructure and project managers ask when considering work is 'where are the constraints' to achieving objectives. Infrastructure Managers take a longer term horizon to these questions.

There is much infrastructure to be built, renewed and maintained in New Zealand over the next 20-30 years. The same is true for the rest of the world. Despite the fiscal tensions and constraints identified in this report, it is likely that with prudent planning that funding is going to be available when needed.

The question that needs to be given consideration is, in a world that plans to spend USD \$47 trillion on infrastructure by 2030 is - is there going to be enough engineering resource to manage, design and build what is required here in New Zealand? If there isn't, then it is time that we started considering in more detail what our resource requirements will be, and how we are going to meet them.

## 13.0 LGA SECTION 100-101 – FINANCIAL MANAGEMENT PROVISIONS

Section 100 – 101 of the Local Government Act set out financial management provisions.

A good summary of these legislative requirements and the implications are set out in the Auditor General's 2012-22 LTP Review <http://www.oag.govt.nz/2012/ltps-2012-22/docs/long-term-plans-2012-22.pdf>.

Councils are required to prepare a Financial Strategy. The Financial Strategy is impacted by infrastructure provision, service levels, costs and capital expenditure.

With the projected fiscal constraint in New Zealand increased scrutiny is expected on the inter-relationships between infrastructure planning and the Financial Strategy in four broad areas.

### 13.1 Fiscal Sustainability

Councils (or other service providers of public assets) will need to demonstrate their fiscal sustainability over the medium to long term. This will include:

- The sustainability of their rating base within projected economic and demographic changes
- The sustainability of communities to pay for projected rates (and rates increases)
- The sustainability of government transfers within the context of current and future policy and fiscal pressures
- The sustainability of debt levels and debt servicing costs

### 13.2 Sustainability of Service Provision and Service Levels

It is inevitable that with fiscal constraint and with the projected changes in urban form there will be pressure on the sustainability of service levels, particularly in provincial and rural New Zealand.

In some activities the sustainability of service provision will be challenged and questioned. Technology and demographic change will also drive rapid change in service expectations, service standards and service levels.

Councils will need to demonstrate the sustainability of service provision and service levels.

Benchmarking of services and costs is inevitable and as society faces tough choices on the affordability of the services purchased there will be increasing scrutiny across public infrastructure assets as to what is needed and what is affordable.

Indices and measures will need to be developed and maintained to demonstrate service level and service provision sustainability

### 13.3 Infrastructure Management Sustainability

Infrastructure provision is one of the keys to successful modern economies, and as such will always be funded to a level. The questions that will be asked in increasing detail will revolve around:

- What infrastructure is needed
- What risks can be safely taken in the maintenance – renewal continuum
- What expenditure is needed and when
- Can the community afford this expenditure
- Is the expenditure necessary
- What is the business case for the expenditure

### 13.4 Risks to Sustainability

With the focus on sustainability of infrastructure service provision in the medium to longer term examining:

- Fiscal Sustainability
- Service Provision and Service Level Sustainability
- Infrastructure Management Sustainability

There will also need to be clear communication to governance decision makers (local and national), auditors and other interested parties around the risks to sustainability.

Discussing sustainability risks will involve hard to have conversations, and multi-scenario analysis of potential risks and consequences. As an industry we are going to need to get much better at this to enable our governance decision makers with enough information and understanding to make the increasingly difficult trade-offs and decisions around services and infrastructure.

## 14.0 SUMMARY

There are plenty of challenges in delivering infrastructure related services to our communities over the next 20 years or more. These challenges are manageable and affordable but will require careful and insightful management.

This paper can be summarised as:

- New Zealand is doing well in international terms
- There are multiple fiscal and demographic challenges
- Using Other People's Money issues – slicing the fiscal pie
- Other sectors want the money you get now
- Councils sources of revenue constrained for the next 10 years +
- Most growth will be in the 65+ population
- This will lead to multiple urban network and space changes
- Funding for capital and maintenance will be constrained
- Transportation - more hierarchy differentiation, specified service levels?
- Major expressways still to be built – capex, maintenance cost
- More need for modeling of effects in dTIMS, RAMM, similar models
- Utilities – the major renewal peak is in the next 20-30 year period
- Parks, Property and Community Assets – more and higher demand during a period of fiscal constraint
- More need for expenditure optimisation
- There is going to be less money!
- What money you do get will require stronger business cases – better modeling, better optimization
- We are going to need to resolve the budget, service level, risk triangle
- Major urban form changes are likely in the next 20-30 years (this coincides with asset lifecycles) – where, what, what impact in your urban areas?
- Urban form changes will require different / new assets
- Some rural towns will run down to nothing! (demographics take care of this)
- **Please make sure you are building the right assets in the right place, in the right form** (we don't have the fiscal space to waste money)

The need for infrastructure management and planning will increase significantly as a result of these long term pressures, and it is likely that when looking back in 2030 we will view the last 17 years of infrastructure management practice (1996-2013) as only the first steps.



## 15.0 PRESENTER BIO AND CONTACT DETAILS

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### Brief biography on the Presenter:

Ross Waugh, Director, Waugh Infrastructure Management



Ross is the founder of Waugh Infrastructure Management and is an asset management and systems integration specialist with 30 years' experience in municipal infrastructure asset management and engineering. Ross has been consulting in infrastructure management for 14 years, in the areas of transportation, utilities, community facilities and property. Ross has contributed to a number of New Zealand national data capture, advisory and infrastructure standard setting projects, and is a section author of the International Infrastructure Management Manual 2011.

Ross is passionate about assisting people to practice infrastructure asset management holistically and comprehensively yet practically. His strategic analysis of client practices is balanced with a strong practical background that always ensures results not theory. Ross has experience of four cycles of integrating infrastructure asset management planning with long term financial planning within the New Zealand context.

Ross takes an active interest in on-going International infrastructure asset management trends. Ross has presented internationally on infrastructure asset management, most recently in June 2012 at the International Federation of Municipal Engineers Conference in Helsinki, Finland.

Ross has also provided input into International Asset Management Practice Reviews.

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