CONTROLLER AND AUDITOR-GENERAL
Tumuaki o te Mana Arotake

Water and roads: Funding and management challenges

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Contents

Auditor-General's overview and conclusions

Collectively, local authorities are responsible for more than $100 billion of community assets that provide essential everyday services. Local government's asset management has been a longstanding and important focus of work that my Office has reported on for nearly two decades.

This report sets out an overview of the approach that local authorities are taking to managing their infrastructure assets. We focused on assets used to deliver four networked infrastructure services operated by local authorities. The services are roading and the "three waters": water supply, wastewater, and storm water services.

Because the services these assets provide are so essential, I wanted to analyse the state of the assets, where and when major reinvestments are required, and whether asset management practice is giving local authorities the information they need to continue providing services into the future. The purpose of this report is to stimulate debate rather than to provide definitive solutions.

New Zealand has a good reputation internationally for managing assets because of the work of groups such as New Zealand Asset Management Support (NAMS). However, many local authorities' asset management practices fall short of asset management guidance, such as that developed by NAMS. This report suggests that local authorities need to better understand the local economy to plan for the longer term and that their management of infrastructure and capital needs to improve to meet the challenges ahead.

Two sets of information make up this report:

- We analysed the asset-related financial and performance results of all local authorities, including specific asset management and service-level work on 31 selected local authorities. These results were collected through the work of my auditors. The 31 local authorities we looked at owned 74% of total local authority property, plant, and equipment assets at 30 June 2013.
- We commissioned research from the New Zealand Institute of Economic Research (NZIER). The NZIER report provides a historical perspective of local government investment trends, the forecast investment outlook, and observations on differences in investment between the regions.

After more than 20 years of financial and asset management reforms and efforts, local authorities have various asset and financial management systems to support their decision-making. Our analysis shows that most local authorities' planning and decision-making about their infrastructure services, assets, and associated funding are adequate for short- to medium-term planning. However,

local authorities need to do more to manage infrastructure and financial strategies for the long term, given the wider economic and population changes we face.

It's about using money for infrastructure effectively and efficiently

In our May 2014 report, *Reflections from our audits: Our future needs – is the public sector ready?*, we said that "If you rely on something, you need to recognise it and manage it over the long term." Changes such as wider economic and population changes mean that good infrastructure and financial management "is not just about having money – it is about using that money effectively and efficiently".

During the period we reviewed (2007 to 2013), local authorities consistently spent less than they intended on capital works, including on asset renewals. There are often explanations and good reasons for under-spending, such as project delays.

However, the ratio of forecast renewals expenditure to depreciation in local authorities' 2012-22 long-term plans also shows a downward trend in asset reinvestment. If actual spending trends continue to match those forecast, we estimate that, by 2022, the gap between asset renewals expenditure and depreciation for the local government sector could be between $6 billion and $7 billion.

Spending according to budget is only sensible and appropriate if the budget is likely to be a good guide of what should be spent. Infrastructure assets also typically have long useful lives. This means that we cannot draw firm conclusions on the basis of the forecast and actual financial information available for analysis.

These spending trends raise questions about local government asset planning, depreciation practices, and capital expenditure management. They should prompt each local authority to review these factors and consider whether there are better ways to plan and manage capital investment and development, and future funding. Local authorities should consider the effect of life-cycle costs – including operations and maintenance, renewals, and deprecation – during the life of the asset alongside their financial strategies and funding mechanisms.

Improve information about assets to help make the right calls

Although local authorities tend to have a lot of data, they do not necessarily use it well or use the best data to support decision-making. In our analysis, we found that local authorities:

- have better and more reliable information (such as condition and quantity) about their above-ground assets than their below-ground assets;

- are likely to know more about newer assets than older assets (such as those that have been in the ground for 50 years); and

- are more likely to reinvest more in their roading assets than in their "three waters" assets (based on the ratio of their forecast renewals expenditure to depreciation).

We also found little relationship between asset expenditure and service-level performance in public information.

Good information about network asset performance helps good decision-making about capital expenditure and how to fund that expenditure. Therefore, the results of our analysis raised questions for us about the information local authorities use for asset maintenance, renewal, and replacement decisions. Our analysis suggested that local authorities could make better connections between critical information to increase the chances of making decisions that get the best results.

Good information is built from data that:

- has consistent definitions and metadata, and is high quality;

- is used to look at trends and to compare organisations and jurisdictions; and

- is studied alongside other sets of information to identify wider implications and needs.

Our own observations and advice from experts is that other countries (such as the United States of America, the United Kingdom, and Canada) have better quality data and collection practices than those that our local authorities use to manage water and roading assets.

In my view, the evidence base for good decision-making and learning is not consistently available. However, it needs to be. Local authorities need to build their capability to use their information and systems to get the best performance from their asset networks. They need to understand how assets perform throughout their lives to know the points at which and whether to maintain, renew, or replace individual asset parts.

There are examples of positive information initiatives by some local authorities (as well as other public sector agencies) to improve infrastructure and financial management. However, I am concerned that some local authorities might not have the capacity for the increasing sophistication of information needed to keep delivering essential everyday services to communities affordably.

For local government infrastructure, it matters where people choose to live and work

The overall message in NZIER's report is that wider economic and population changes mean that there are long-term risks to local government's infrastructure and financial management. In *Reflections from our audits: Our future needs – is the public sector ready?*, we said that "Recent experience suggests that the financial implications of change can be material, intergenerational, sometimes unequal and, above all, difficult to control." We also said that "the complex and interrelated problems facing New Zealand ... will continue to put financial and service expectation pressure on the public sector. The public sector will need to be in a position to make the right calls on questions about large investments in assets and using resources."

New Zealand is a relatively young country and is still undergoing significant change. Population movement into urban centres will continue to drive capital investment, particularly in areas such as Auckland, Hamilton, and Tauranga. At the same time, economic and population growth will decline in some provincial areas. New Zealand also has an ageing population. Retirees might own assets such as their home, but their incomes often do not change much and they might be living on savings.

New Zealand's population changes will affect demand for, and the affordability of, the services provided by infrastructure assets. This will result in diverging futures for regions. NZIER considers that three broad groups appear likely:

• prosperous <u>and</u> growing places, which <u>will</u> need increasing capital;

• prosperous <u>or</u> growing places, which <u>might</u> need more capital; and

• poor <u>and/or</u> declining places, which might need to plan for a <u>lower</u> requirement for capital.

Managing the funding and timing for infrastructure development in areas of growth is challenging. For most of the last hundred years, as a country, we have built for growth. Now, up to nine regions face declining forecasts. For places in these regions, managing networked infrastructure services in conditions of economic and population decline, while standard and service-level expectations increase, might be more challenging. Although New Zealand has seen population movements before, today's population and economic changes could present infrastructure and funding challenges with which we have little experience.

The challenge for robust asset and service future planning is to find the optimal track to the future.

Understand the local economy to plan for the future

Population and economic growth is concentrating in some places and declining in others. Local authorities need to plan the operating and capital expenditure they need to maintain their services, and the related funding implications. Different regions need to plan for quite different futures. Having realistic and detailed asset management plans, co-ordinated with funding sources (including affordable rates), will be important.

In places with declining economic growth and ageing and shrinking populations, local authorities could end up with under-used assets (such as roads and water treatment plants). These assets will still need to be maintained and renewed so they can continue to provide services. Local authorities operating, and communities served by, these assets will eventually face costly replacement decisions on shrinking revenue bases.

Some local authorities will face real difficulties in managing decline and in ensuring that their assets are the right size for their needs. They might hope that capital investment will reinvigorate growth and prevent further decline – but it may be only hope. NZIER's work suggests that decline scenarios are more likely than growth for many.

Infrastructure development waves create investment echoes

In its analysis of the last hundred years, NZIER identifies two clear waves of investment for assets other than roads: in 1920-30 and from 1950 to 1986. Investment in roads peaked around 1965, then trended lower until 1990. It then trended higher between 1990 and 2013. Borrowing by local government for capital investment has tended to be synchronised with infrastructure investments.

Infrastructure development waves are likely to create investment echoes. Local authorities need to be prepared to manage these infrastructure renewal cycles.

Industry experts and practitioners in NZIER's workshop session advised that many roading assets could be approaching second or third renewal cycles, with bridges next approaching a renewal cycle in about 2025. Although the timing for three waters assets is difficult to predict, because councils are more likely to take a "run-to-fail" approach to underground assets, our experts advised that a significant renewal cycle of three waters assets is likely to occur during 2040 to 2060.

The date of construction is one of several influences on the likely life of assets built during these investment waves. Factors such as the redevelopment of urban centres and changes in technology are also important.

Local government is strongly affected by mandate and central government funding

The construction of capital assets in waves eventually echoing in replacement needs could be costly. NZIER's historical analysis shows that local government income is highly dependent on the legislative mandate set by the Parliament. It is also strongly affected by fluctuations in central government funding and the overall economic cycle.

The historical data shows how the local government sector has changed over time, including changes to its purpose, role, and ways of funding.

We observed that, except for bridges, asset management results were better for roading than for three waters assets. In some instances, the results were only slightly better, but in others they were significantly better. More than one factor is likely to account for this difference. For example, roads are above ground, which makes it easier to assess their condition. Roads also have a shorter life expectancy so are more likely to need frequent attention.

However, it is likely that the arrangements for roading funding and management also play a part. Local authorities receive funding towards capital expenditure on roading through New Zealand Transport Agency (NZTA) subsidies. In contrast, capital expenditure on three waters assets comes primarily from rates and other revenue.

NZTA requires local authorities to provide regular information to receive roading subsidies. NZTA regularly audits the information in local authorities' roading asset management information systems. Although there have been government grant and subsidy schemes for water (for instance, the wastewater subsidy scheme administered by the Ministry of Health), there are no arrangements similar to transport for three waters or other local authority assets.

Changes are emphasising long-term asset planning

I have been pleased to see a greater focus on long-term asset planning in central and local government. Examples include the National Infrastructure Unit within the Treasury preparing a National Infrastructure Plan and Local Government New Zealand's Three Waters project work.

The 2014 amendments to the Local Government Act 2002 require long-term plans to include an infrastructure strategy. Local authorities will need to develop these strategies by 1 July 2015 for inclusion in their 2015-25 long-term plans. The purpose of this strategy is to identify significant infrastructure issues, options, and implications during a 30-year period.

Overall, 30-year strategies will be a useful planning tool for local authorities only if they are supported by robust information about asset performance. The strategies will also need to deal with a range of economic outlooks and plausible states for the district or region. Local authorities will need to match their revenue and financing policies, and their choice of funding tools, to their asset management and service intentions. Linking the infrastructure policy to the financial strategy is therefore critical. Local authorities will also need to improve their understanding of the resilience and future needs of their networked assets and services to address risks, including those posed by major geo-hazards.

Local government infrastructure and capital management needs to improve to meet the challenges ahead

All this means that local authorities need to "step up" in managing their infrastructure assets. For instance:

- The focus needs to be on sustainable services and long-term fiscal strategy, not short-term budgets.
- Planning and risk management exercises must inform decision-making. All those involved with asset services need to talk and work closely — planners, asset managers, finance officers, engineers, and operational departments. Budgeting must be connected to planning, asset management, service management, and risk management.
- Although local authorities tend to have a lot of data, they do not necessarily use it well, or use the best data, to support decision-making.

In seeking feedback on the draft of this report, we received two different points of view. We were told that we needed to consider how asset management practices should fit the size and scale of local authorities. We also heard that we had not been demanding enough about the improvements in long-term asset and financial management needed to protect and make the right investments in roading and water infrastructure for the future.

These are valid observations and deserve debate by both local and central government, so our regions and communities can continue to have the core services so essential to our well-being.

In 2015, my appointed auditors for local authorities will audit the 2015-25 long-term plans, which will include 30-year infrastructure strategies for the first time. Because these strategies are a new requirement, the 2015 versions are likely to be the basis for improvement and development in future long-term plans.

However, these infrastructure strategies will cover periods during which local authorities will need to make decisions about, and changes to, the services and service levels that they can sustainably and affordably provide.

Councillors and communities need good information so they can understand and make choices about the services that are so important for their future. We have found that the information to enable understanding and choices is not consistently available – this must change.

Ultimately, stepping up a gear is needed to allow the development of more appropriate and robust service and funding strategies – something that is fundamental to their overall financial strategy, and to all current and future ratepayers.

I thank my auditors for their assistance with the analysis of the financial, asset, and service performance of local authorities. I also thank NZIER for its historical perspective on local government investment cycles during the last 50 years.

Lyn Provost
Controller and Auditor-General

7 November 2014

Introduction

Purpose and objectives of this report

1.1 Local authorities have reported on their major infrastructure assets since the early 1990s. This reporting has also coincided with the development of the discipline of asset management planning and a cycle of substantial reinvestment in assets.

1.2 Because these assets are an essential element of local government services, we wanted to analyse and provide an overview of the state of local government assets, where and when major reinvestments are required, and whether asset management practice is giving local authorities the information they need to continue providing services into the future.

1.3 This report sets out an overview of the approach that local authorities are taking to managing their infrastructure assets. We focused on assets used to deliver four networked infrastructure services operated by local authorities. The services are roading and the "three waters": water supply, wastewater, and storm water services.

1.4 The assets we focused on have particular features in common:

- *They are often found in a network that serves a defined community.*
- *The system as a whole is intended to be maintained indefinitely, even if individual assets or components within it are replaced or upgraded.*
- *They deliver a service to a particular level.*[1]

How we did our work

1.5 To inform our work, we analysed the financial results and forecasts of all local authorities that are relevant to the management of their roading and three waters assets. This data does not include Christchurch City Council because, after the Canterbury earthquakes, it was exempted from preparing a long-term plan in 2012. All references in this report to forecasts in the 2012 long-term plans exclude forecasts by Christchurch City Council.

1.6 We also collected and analysed specific information about how 31 local authorities (listed in the Appendix) manage their assets. The 31 local authorities provided information about asset condition, performance information, financial forecasts, asset valuations, and their asset management information systems. These 31 local authorities own property, plant, and equipment worth $77.5 billion (which was 74% of all local authorities' property, plant, and equipment assets at 30 June 2013).

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1   Audit New Zealand (2010), *Asset management for public entities: Learning from local government examples*, page 75.

1.7   To understand local government investment cycles, we commissioned a report from the New Zealand Institute of Economic Research (NZIER). The NZIER report provides a historical perspective of local government investment trends, the forecast investment outlook, and observations on differences in investment between the regions.

1.8   NZIER held a workshop on a draft version of its report. The workshop was attended by asset and financial management practitioners and advisers, staff from the National Infrastructure Unit of the Treasury, and staff from the Department of Internal Affairs.

1.9   The rest of this report presents the results of this work:

- Part 2 sets out our analysis of how infrastructure assets are currently managed and the implications for their future management.
- Part 3 contains NZIER's report – *Local government finances – A historical perspective*.

What infrastructure assets did we focus on?

Roading services

1.10   The roading network provided by local authorities comprises sealed and unsealed roads. It also includes bridges, retaining structures, footpaths, kerb and channel systems, street lighting, signs, and street furniture (such as cycle stands and seats). Many local authorities also have a network development programme of building new roads and related assets, which is included in their asset management programmes.

1.11   The primary aim is to provide a safe and efficient roading network that facilitates the movement of people and goods.

The three waters services

Water supply

1.12   Local authorities own, provide, and maintain the assets and services that supply our water. Water supply assets include buildings, land structures (such as reservoirs), pipes, and mechanical and electrical equipment.

1.13   Water is predominantly sourced from rivers, lakes, and bores. Other water sources include private community schemes, private wells, and rainwater collection.

1.14   The water supply network needs to be reliable, available, and of a high quality. It must meet the needs of domestic, commercial, and industrial consumers. Local authorities are also responsible for providing water supplies for fire fighting in urban areas.

Wastewater

1.15   Most domestic wastewater is disposed of through reticulated systems.

1.16   Wastewater assets comprise pipe reticulation and fittings, pump stations, manholes, and wastewater treatment plants and equipment.

1.17   The primary purpose is to minimise health risks (such as diseases) from waste and waste by-products. The secondary purpose is environmental protection.

Storm water

1.18   Local authorities provide storm water assets and services to protect properties from flood damage (for example, by managing overflows through storm water collection and disposal).

1.19   Storm water is often collected through road storm water pipes and channels, and then dispersed to natural waterways.

2

How infrastructure assets are currently managed

2.1   In this Part, we set out what we have learned about how local authorities currently manage their infrastructure assets. This Part draws together information from our analysis of:

- all local authorities' audited financial statements and long-term plans (see paragraph 1.5); and
- asset management information for 31 local authorities (see paragraph 1.6).

Approaches to financial strategy

2.2   In our 2012 report, *Matters arising from the 2012-22 local authority long-term plans*, we set out the themes that we repeatedly observed in long-term plan financial strategies. These themes were:

- reducing or deferring spending;
- an increased use of district-wide funding to spread the costs of upgrading infrastructure for small communities;
- the need for several large infrastructure projects to meet legislative requirements;
- a focus on stabilising or reducing overall debt; and
- delaying capital projects because of lower or uncertain growth.[2]

2.3   Local authorities adopted financial strategies that included "just-in-time" responses to growth-related capital expenditure. Many reduced the forecast level of renewals and took a "sweating the assets" approach – which meant delaying renewals work until it was unavoidable. Local authorities were also reducing the "nice to have" projects and adopting "run to failure" approaches – which meant waiting until a component stopped working before replacing it, rather than replacing a component before it failed.

2.4   Local authorities took these approaches to rein in rate increases and to maximise their efficiency. However, such approaches might not be appropriate in some circumstances. Research has shown that optimisation analysis can result in between 15% and 25% long-term cost savings compared to reactive maintenance planning.[3] Therefore, using such approaches could mean that local authorities miss opportunities for appropriate interventions that could be more effective in the long run.

2.5   Figure 1 sets out what the Institute of Public Works Engineering Australasia New Zealand considers to be common problems with long-term planning by local authorities.

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2   *Matters arising from the 2012-22 local authority long-term plans* (2012), paragraphs 2.22-2.46.

3   Dr Theuns Henning, Senior Lecturer, Civil and Environmental Engineering, University of Auckland, correspondence to the Office of the Auditor-General, 20 October 2014.

Figure 1
Common problems with long-term planning by local authorities

The Institute of Public Works Engineering Australasia identifies the following long-term planning issues it says are common among local authorities:

- *The 4 year budget 'blip' – often attributed to deferring rates rises outside the 3 year political cycle.*

- *The 11 year budget 'blip' – typically occurs as a result of pushing 'unknowns' or difficult decisions outside the ten year visible budget window.*

- *The annual "It's Up For Grabs" plan – leading to a lack of focus on getting forecasts for year 2 onwards right as there is a perception that there will be a chance to review each year.*

Challenges in looking out 30 years and beyond include:

- *Will Council infrastructure services remain the most viable, cost effective, affordable option for our smaller and declining communities? Should we even assume some of these communities will exist in 30 years?*

- *How resilient is our infrastructure? Through our participation in 'lifelines projects' can we state our levels of service following major disasters and have we engaged with communities over the acceptability of these?*

- *If the long term cost of service is 'unaffordable', what are our options – exit, cross subsidise, etc.? Do we know what 'unaffordable' is for our communities?*

- *Should we assume our existing institutional structures are the best form to manage the infrastructure over the 30 year period? Are the outcomes of local government reviews likely to see other 'most likely scenarios' other than continuation of current form?*

- *Do we really know enough about the expected lifecycles of our assets to produce reliable long term forecasts – if not, what more do we need to do?*

- *What are our assumptions around key funding agencies (e.g. NZTA) and regulators (e.g. regional councils)? Have we adequately engaged to understand the 'most likely scenario' from their perspective?*

Source: Institute of Public Works Engineering Australasia New Zealand, Infrastructure Strategy Discussion Paper, October 2014.

Current approaches make better and integrated information essential

2.6   To carry out effective and integrated infrastructure strategies, local authorities need to:

- have good information about the condition and performance of their assets;
- integrate that information with financial and service delivery decisions and risk management; and

- link their spending on maintenance and renewals to an optimised decision-making approach.

2.7   Decisions about how to manage infrastructure need to be made in the context of each local authority's financial position and prospects, and the circumstances of its community. Local authorities cannot separate decisions about their assets and service delivery from considerations about funding sources and timing (of funding and of renewal or replacement work). Asset intentions need to be matched with revenue and financing policies and funding tools, which, in turn, are based on information about assets and service delivery.

2.8   Decisions about infrastructure investment and services require effective and defined connections between assets, service delivery levels, and funding. Asset management decisions are so closely linked to a local authority's financial strategy that any weak link can undermine the strength of the "asset management chain".

2.9   Figure 2 shows how we see asset management and financial strategy interacting to contribute to good infrastructure strategy.

Figure 2
Aspects of asset management that contribute to good infrastructure strategy
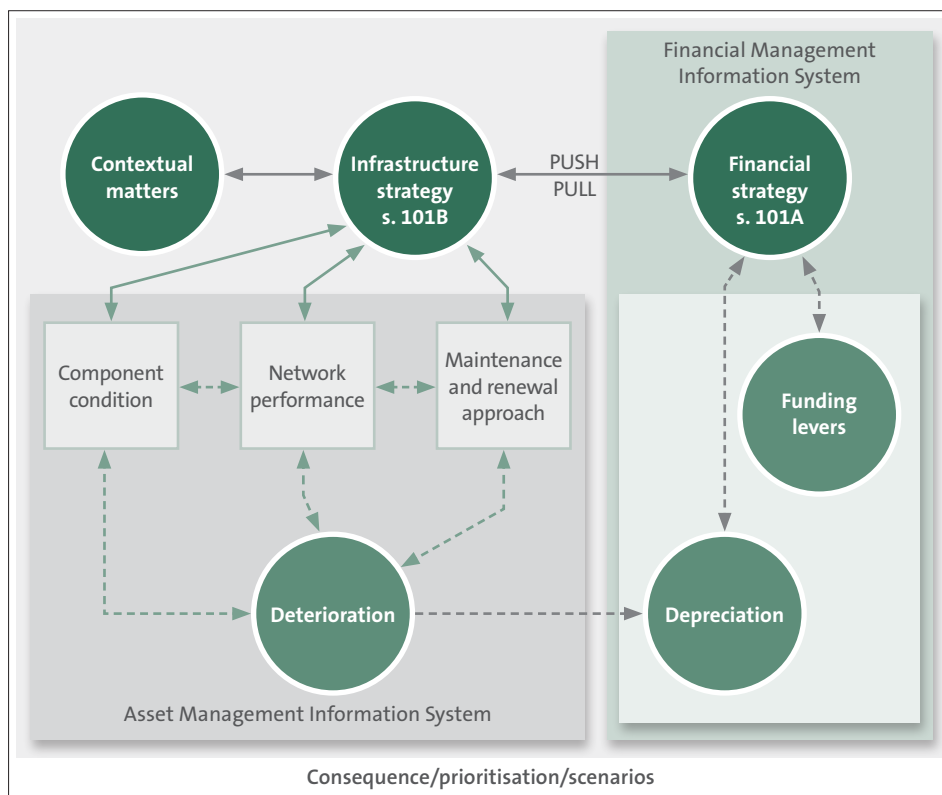
Note: Sections 101A and 101B are references to the Local Government Act 2002.

Approaches to infrastructure strategy

2.10   All local authorities forecast their asset values and capital expenditure for at least 10 years. Some local authorities forecast for a longer period. For example:

- Nelson City Council's plans for managing its three waters assets use 30-year forecasts for capital expenditure and renewals.

- To work out depreciation and likely effects on rates revenue, New Plymouth District Council uses 50-year roading forecasts.

- In 2012, Kapiti Coast District Council prepared a 20-year long-term plan.

- Hastings District Council completes renewal forecasts to 2122. It prepares forecasts to 2062 for water supply capital expenditure and 10-year forecasts for operating expenditure. Its water supply optimisation study includes anticipated growth in keeping with the Council's urban growth strategy for the next 50 years.

Assumptions are mainly about cost factors

2.11   When local authorities forecast their spending, they typically base their forecasts on assumptions about:

- the reliability of the estimated costs of major projects or capital items;

- expected inflation or cost adjustment factors;

- funding uncertainties, such as the level and amount of funding that the New Zealand Transport Agency (NZTA) will provide; and

- consequential effects on operating expenditure of the forecast capital additions.

Capital expenditure trends show local authorities achieve less than planned

2.12   Figure 3 shows the forecasts of capital expenditure from all local authorities' 2006, 2009, and 2012 long-term plans, and annual plan budgeted and actual capital expenditure from 2011 to 2013 annual reports.

Figure 3
Forecast capital expenditure in annual plans and long-term plans, and actual capital expenditure in annual reports
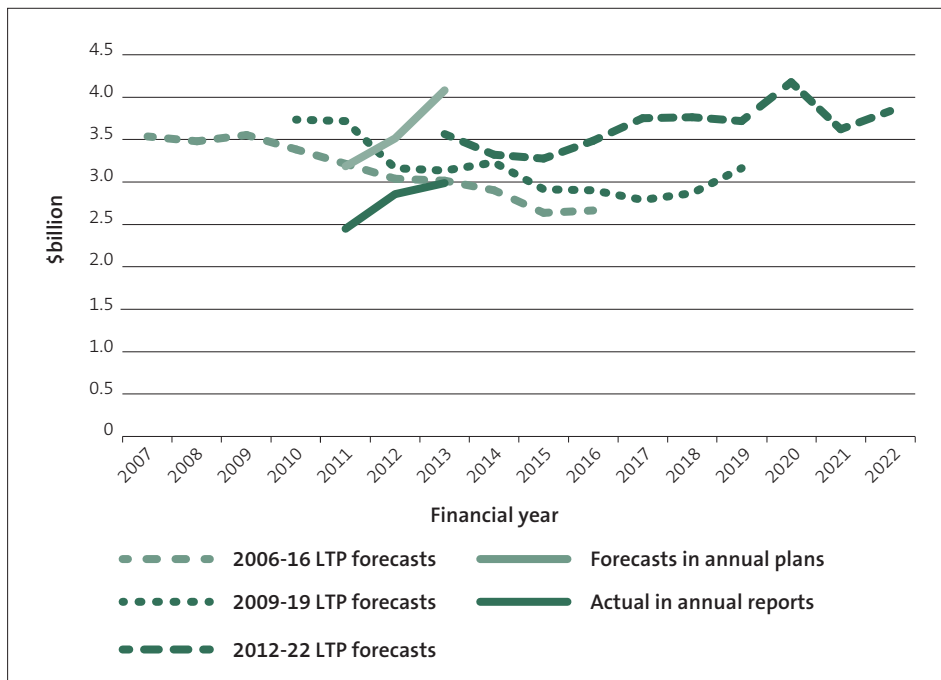
2.13   Figure 3 shows that the actual capital expenditure for 2011 to 2013 recorded in annual reports is quite different from that forecast in earlier annual plans and long-term plans.[4] Collectively, local authorities have spent less on capital expenditure than forecast from 2011 to 2013.

2.14   Industry experts and practitioners told us that there are a variety of reasons for the differences between forecast and actual capital expenditure. These reasons include:

- aspirational budgeting and/or poor planning, such as being too optimistic about timing and obtaining the necessary resource consents;
- reprioritising capital expenditure in response to unexpected events;
- delaying growth-related expenditure because of lower than expected or uncertain growth; and
- getting better contract rates than those budgeted for.

2.15   Our analysis suggests that capital planning has considerable variation and uncertainty, which results in a tendency to not spend as much as intended. It suggests that local authorities need to improve how they:

4   Watercare is not included because its financial statements do not include forecast data.

- identify capital expenditure requirements;

- assess the funding tools available to cover the expenditure;

- consider who will do the capital work; and

- match raising funds with carrying out capital work.

2.16   Some local government entities are working to improve their asset and associated capital expenditure management. Figure 4 shows how Auckland Transport is working to manage its capital expenditure.

Figure 4
How Auckland Transport optimises capital management and expenditure
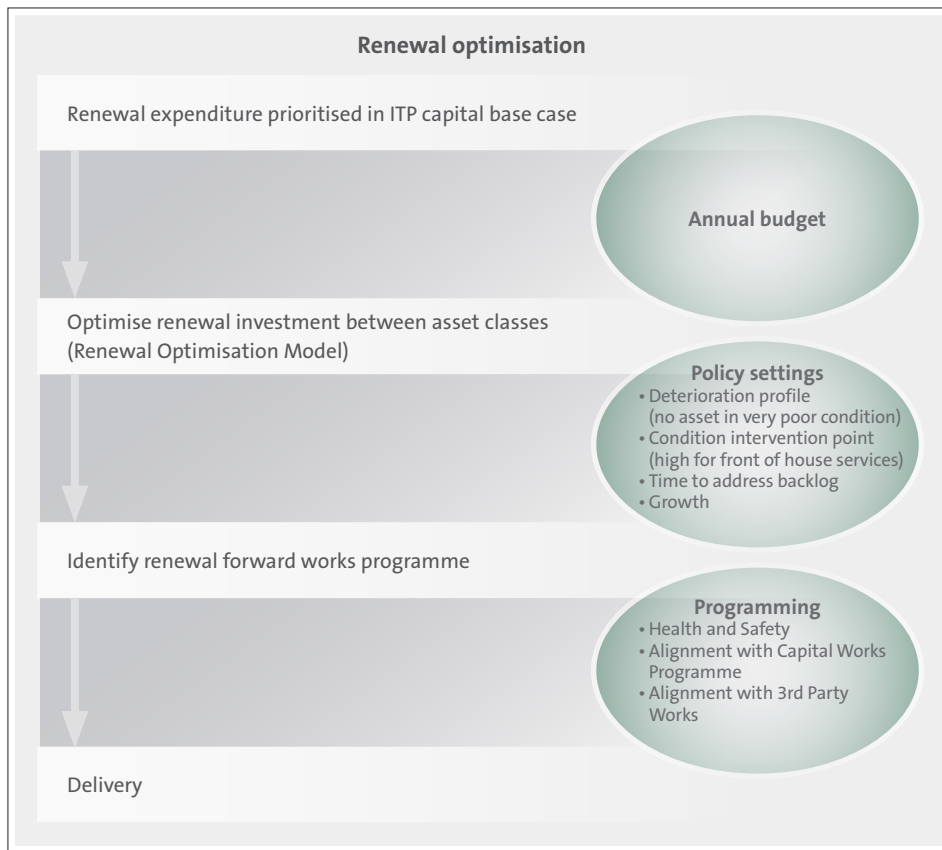
Auckland Transport is a council-controlled organisation and a subsidiary of Auckland Council. Auckland Transport was formed in November 2010. It is responsible for all the Auckland region's transport services (excluding state highways), from roads to footpaths, cycling lanes, parking, and public transport.

Auckland Transport owns $16 billion of assets. These assets include 7200km of roads, 100,000 street signs, 536 signalised intersections, 1585 bus shelters, and 58 railway stations and ferry terminals. Budgeted capital expenditure for 2013/14 is about $859 million, and operating cash expenditure is about $603 million.

Auckland Transport has been working on its asset information, decision-making systems, and capital works programming to deliver its capital programme better.
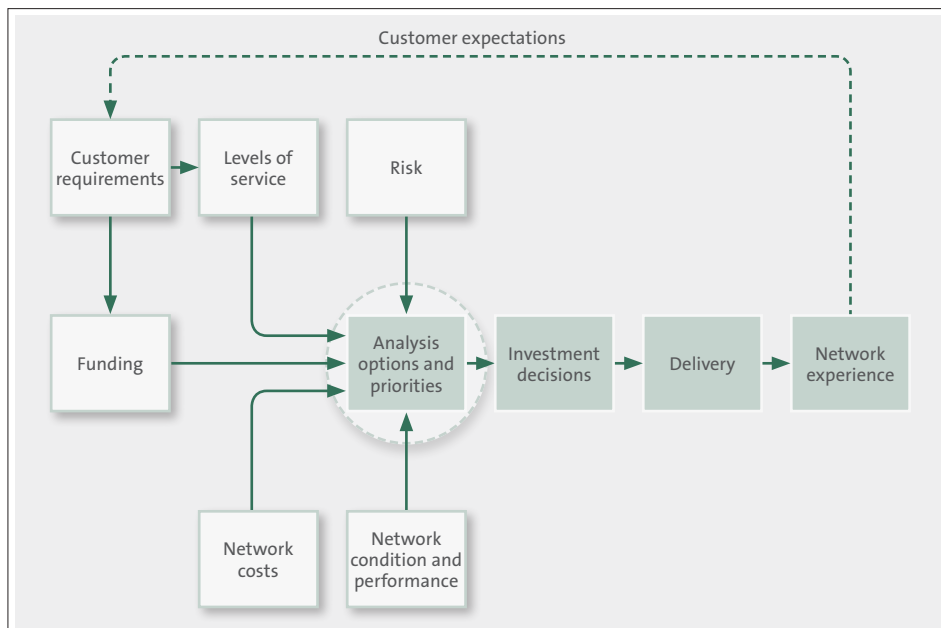
Auckland Transport has prepared a model for forecasting renewals work based on the condition of its assets. The model has been reviewed by NZTA, the Ministry of Transport, University of Auckland, and others in local government.

Renewal optimisation

Renewal expenditure prioritised in ITP capital base case

Annual budget

Optimise renewal investment between asset classes
(Renewal Optimisation Model)

Policy settings
• Deterioration profile
(no asset in very poor condition)
• Condition intervention point
(high for front of house services)
• Time to address backlog
• Growth

Identify renewal forward works programme

Programming
• Health and Safety
• Alignment with Capital Works
Programme
• Alignment with 3rd Party
Works

Delivery

Auckland Transport's asset management initiatives mean that it has a well-understood programme of both renewals and new capital projects. Its scale of operations means that, if there are delays or issues with one project, another project of a similar priority is ready to be advanced. This means that the capital programme as a whole is not unduly delayed.

For 2013/14, Auckland Transport achieved a financial result within 1% of its renewals capital budget. It believes that its forecasting model could be useful to other local authorities.

Auckland Transport plans to further refine its forecasting model to reflect the factors that influence customer satisfaction and prioritise renewal work based on both the condition of the assets and customer satisfaction measures. Auckland Transport told us that it is doing further analysis that will allow it to directly compare the cost of renewal and the requirements for maintenance expenditure.
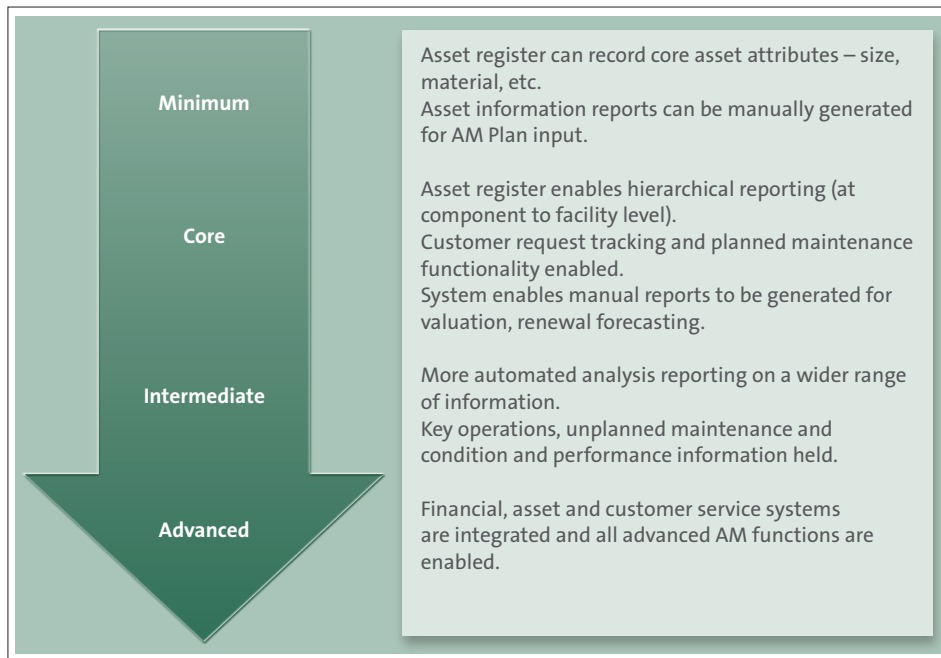
Source: Auckland Transport.

Asset management information systems used by the 31 local authorities

Most local authorities do not use the full functionality available in their asset management information systems

2.17   For entities with complex networks of assets, a formal asset management information system (AMIS) is an important tool for dealing with the amount of information and analysis needed to support those assets.

2.18   Asset managers and decision-makers need a formal AMIS to help determine whether the best course of action is to maintain, renew, or replace (through new capital investment) assets. An AMIS can transparently justify the level and funding of asset-related spending.

2.19   The basic features of an AMIS provide essential information about assets. These basic features are what local authorities most commonly use. The features include the asset register, financial information, maintenance work recording, condition assessments, a record of which assets are critical, and a record of customer service requests.

2.20   However, few local authorities use the more advanced functions offered by an AMIS. Advanced functions can include maintenance planning, asset performance, deterioration modelling, life-cycle cost optimisation, work management, risk management, and inventory control.

2.21   In our view, using a fuller range of AMIS functionality would help local authorities to manage better quality and more consistent information about their assets. Industry experts agreed that using more AMIS functionality is necessary and that there is no need for this to be difficult.

2.22   Figure 5 shows the range of AMIS functionality from minimum to advanced.

Figure 5
Information Systems Maturity Index

Maturity Level	Description
Minimum	Asset register can record core asset attributes – size, material, etc. Asset information reports can be manually generated for AM Plan input.
Core	Asset register enables hierarchical reporting (at component to facility level). Customer request tracking and planned maintenance functionality enabled. System enables manual reports to be generated for valuation, renewal forecasting.
Intermediate	More automated analysis reporting on a wider range of information. Key operations, unplanned maintenance and condition and performance information held.
Advanced	Financial, asset and customer service systems are integrated and all advanced AM functions are enabled.

Source: NAMS (2011), *International Infrastructure Management Manual*, page 4/28.

2.23   As for any important information system, a local authority should carry out formal reviews to ensure that its AMIS is reasonably comprehensive, complete, and cost-effective. An AMIS should meet the needs of its users.

Asset information and financial management information is manually integrated

2.24   The AMIS is often the repository for all detailed information about physical assets. The AMIS needs to be integrated with the financial management information system (FMIS). The 31 local authorities we reviewed all have separate information systems for managing their assets and for managing their finances.

2.25   An FMIS can also include information about financial activities related to assets, such as the fixed asset register. The types of information extracted from the AMIS include additions, renewals, disposals, depreciation charges, revaluations, and useful lives.

2.26   Both the AMIS and FMIS are important for managing a local authority's infrastructure and financial strategy. They need to integrate and be easily reconciled. Manual interfaces that are not reconciled frequently create information management risks.

2.27   Most local authorities periodically import the source data from their AMIS into their FMIS. This process is predominantly manual – that is, there is no automatic interface between the two systems. Most local authorities reconcile, calibrate, and correct the information between the AMIS and FMIS each year when they prepare their financial statements. A smaller number of local authorities reconcile this information in real time or monthly.

2.28   A few local authorities aspire to have one system that incorporates all their asset and financial information. One system will reduce the risk of errors in transferring the information between systems. Using a fuller range of the functionality of an AMIS and FMIS could also reduce the risk of errors and the reliance on manual procedures.

2.29   Most local authorities have a hierarchy and assigned categories of data about their assets. These categories are used to help local authorities with decisions about the criticality of the level of service to be delivered and the condition to be maintained. Most local authorities are confident that their AMIS contains all the important information about their significant and major assets.

Transport funding requirements mean that asset systems and information about roads are reasonably maintained

2.30   NZTA requires local authorities to record specific roading information to receive roading subsidies. All local authorities use the Road Assessment and Maintenance Management (RAMM) software to record information about their roading assets. This means that there are formal expectations and standards of completeness and accuracy for information about roading assets. All local authorities are subject to regular NZTA audits of their roading asset information. Local authorities also carry out their own informal reviews.

2.31   Some types of roading assets (such as retaining walls and road signs) are usually not recorded. In some instances, lower value bridges are also not recorded. Local authorities are progressively adding unrecorded assets to their AMIS when inspections are carried out.

2.32   The 31 local authorities know what information about their assets they need, and all (except one) have a formal asset data hierarchy for their roading assets. Two-thirds were confident that the roading information in their AMIS was reliable enough for their business needs.

Greater variability in use of an asset management information system for three waters assets

2.33   For their three waters assets, all but one of the 31 local authorities use external proprietary software for their AMIS or a mixture of externally and internally developed software. The most common systems include Hansen and AssetFinda. Other local authorities use the Detailed Asset Register, Infonet, Geographic Integration System (GIS), Work-It, and Napier Computer Systems (NCS).

2.34   Only about half of the 31 local authorities carry out some form of regular and formal review of their AMIS. Most carry out informal reviews from time to time. Twelve had not carried out any formal review of the effectiveness of their AMIS.

2.35   In our view, core systems need to be regularly and formally reviewed.

2.36   Usually, underground water components, such as connection pipes, that have not yet been identified are not recorded. Because the mains and end points are known, pipe length can generally be reliably estimated.

2.37   All but one of the 31 local authorities know the information they need about their three waters assets and have formal asset data hierarchies for those assets. One local authority said it does not reconcile its AMIS and FMIS for its three waters assets.

2.38   Some of the local authorities did not have recorded formal expectations or standards for the completeness and accuracy of asset information. They were slightly less confident about the reliability of water asset information in their AMIS (compared to roading assets). Most said that their water asset information met their expectations to deliver the relevant services.

Network performance by the 31 local authorities and the condition of components

Information and condition is better for assets that can be seen

2.39   An asset's performance is measured by its ability to provide the required level of service to customers. Generally, this can be assessed in terms of reliability, availability, capacity, and meeting customer demands and needs. A well-performing asset should also help reduce overall operating costs. Measuring an asset's performance should include all factors that could contribute to the asset failing to provide the required level of service.

2.40   Information about assets depends on local authorities' ability to check and assess those assets. Local authorities need to systematically collect data on the condition of their assets –particularly the most critical assets in a network. Networks of connected assets are only as strong as their weakest link.

2.41   Asset management interventions should be driven by data about the factors that determine the cost of service to ratepayers and other users. This includes information about:

- performance, condition, works, and cost, which is required to understand the current cost of service and trends;

- cost driver information such as demand, volume, input price, and demand-related decay models, which is required to forecast maintenance and renewal need and cost; and

- works achieved compared to target/expectation, maintenance compared to renewals expenditure, unit service delivery costs, and condition, which is required to assess trends in the effectiveness and efficiency of maintenance and renewal programmes.

2.42   Condition and performance information should be used to make good decisions about risk management to avoid asset failures, assess the useful lives of assets, and inform asset management renewal and retirement strategies.

2.43   Condition and performance information also determines the need for, and timing of, preventative or remedial action to prevent any loss of service. If a local authority does not know the current condition (and performance) of an asset, this could lead to premature failure, which would leave the local authority with only one option – to replace the asset. Interdependence in and between systems or networks can mean that the failure of a small part in one network can cascade into a multiple or large network failure.

2.44   Local authorities tailor their approaches to concentrate on critical or significant assets, and they have rating scales for the condition of their assets. The information that local authorities hold about surface assets, including condition information, is generally better than their information about below-ground assets.

Roading assets

2.45   All of the 31 local authorities have formal systems for capturing and recording information about the performance of their roading assets. All local authorities carry out regular and formal assessments of the condition of their roading assets.

2.46   The condition of roading surface assets is generally better than the below-ground basecourse. Bridges also appear to be in poorer condition, especially in rural areas, which could be a consequence of greater traffic volumes and heavier vehicles. If upgrading is not an immediate option or priority, local authorities are increasingly using weight restrictions on such bridges. However, weight restrictions effectively lower the service provided by the transport network.

Three waters assets

2.47   Most local authorities have formal systems for capturing and recording the performance of their three waters assets and carry out regular formal assessments of their condition. However, local authorities are likely to know more about newer assets than about older assets (those that have been in the ground for 50 years or more).

2.48   How old an asset is and renewals expenditure to depreciation appear related. "Newer" storm water assets might not require significant renewals expenditure in the near future compared to water supply assets that are older and require more renewals investment.

Asset condition and performance information needs to improve to support decision-making

2.49   Engineers, operations managers, and asset managers generally receive asset condition information. Depending on the nature of the issues, condition information is also reported to the managers and governing body. However, the trends outlined in this Part suggest that decision-making is not supported by the information reported.

2.50   We see parallels between the overall state and practice of local authorities' asset management information and the findings we reported in our 2011 and 2013 reports on Transpower New Zealand Limited. Figure 6 shows how Transpower responded to our findings.

Figure 6
Transpower New Zealand Limited – moving from extensive data to an integrated approach

In our 2011 report on Transpower New Zealand Limited, we noted that Transpower's AMIS did not have the capabilities of a modern asset management system. Although Transpower collected an extensive amount of data, it stored the data in a relatively unstructured way, making it difficult to access. Transpower's AMIS also did not allow predictions to be made.

In 2013, we followed up on our 2011 report on Transpower. We found that Transpower had made good progress in developing an integrated approach to managing assets, had been proactive in its efforts to improve asset and risk management of the national grid, and was appropriately addressing long-term risks to the grid's performance.

Transpower recently received full certification to PAS 55, the British Standards Institution's Publicly Available Specification for Asset Management (which is relevant to gas, electricity, and water utility companies, road and air travel systems, public facilities, processing, and manufacturing and natural resource industries). PAS 55 is an internationally recognised certification for any organisation wishing to demonstrate a high level of professionalism in life-cycle management of their physical assets.

2.51   Public reporting is often provided through asset management plans, including asset strategic planning, and long-term plans, annual plans, and annual reports (which have some asset information) on a local authority's website. Local authorities have a range of performance measures of service levels in public accountability documents. These have usually been drawn from asset and/or activity management plans. However, we found little relationship between public information about asset service levels and financial trend information.

2.52   Several initiatives emphasise the importance of ongoing monitoring and use of network asset metadata, which relies on capturing quality data and having consistent data definitions. Figures 7 and 8 set out two examples of these initiatives.

Figure 7
Transport Analytics Governance Group – developing a common metadata standard

The Transport Analytics Governance Group (TAGG) is a consortium of Auckland Transport, Wellington City Council, Christchurch City Council, and NZTA. The partners in the consortium have in common their transport business, high-volume networks, similar frameworks and information systems, and the dynamic nature of their networks.

The main project in the initial phase is a review of asset metadata standards. Improved functionality in asset management systems has provided an opportunity to standardise practices for all road-controlling authorities. The potential benefits of adopting a common metadata standard include improved quality of asset records, reduced costs of creating asset data, reduced supplier's costs, lower software development costs, an open digital environment that enables innovation in development, sharing asset analytics between different organisations, and enabling detailed national benchmarking – for a range of infrastructure sectors, both public and private. The metadata standard also meets several international standards.

This project's scope includes inventory, works, condition, and performance data, although the initial focus is on inventory. The metadata standard will describe geospatial, image, numerical, and textual asset information.

NZTA is appointing a research contractor to advise on the transition process to adopting fully automated road infrastructure condition monitoring, with the objective of improving the quality, consistency, and coverage of condition data. Collectively, the metadata standard and automated condition rating are also required to manage the potential divergence in measurement standards proposed by the many vendors and suppliers of new technology condition-rating devices.

2.53   Wellington City Council is using geospatial analytics to forecast its infrastructure asset needs beyond 30 years.

Figure 8
**Wellington City Council – using geospatial information to forecast infrastructural asset needs**

Wellington City Council estimates that its assets are decaying at a rate of $2 million each week. In response, the Council is taking an interdisciplinary evidence-based approach to inform decision-making and long-term planning. Its approach incorporates:

- requirements of standards;

- wider social, cultural, environmental, and economic data and models; and

- Council demand, capacity, criticality, resilience, and asset condition data and models.

The Council is applying statistical modelling to this information to forecast the city's long-term asset needs and the financial implications for the Council. Using this approach requires:

- metadata standards, and consistent and reasonably complete data;

- an asset management information system that integrates with the Council's other management information systems and models; and

- analytical capability and data analysis tools.

The Council believes that using its information in this way could generate efficiency and productivity benefits because it will have a greater ability to prioritise and determine the optimum time to carry out capital works and make new investments.
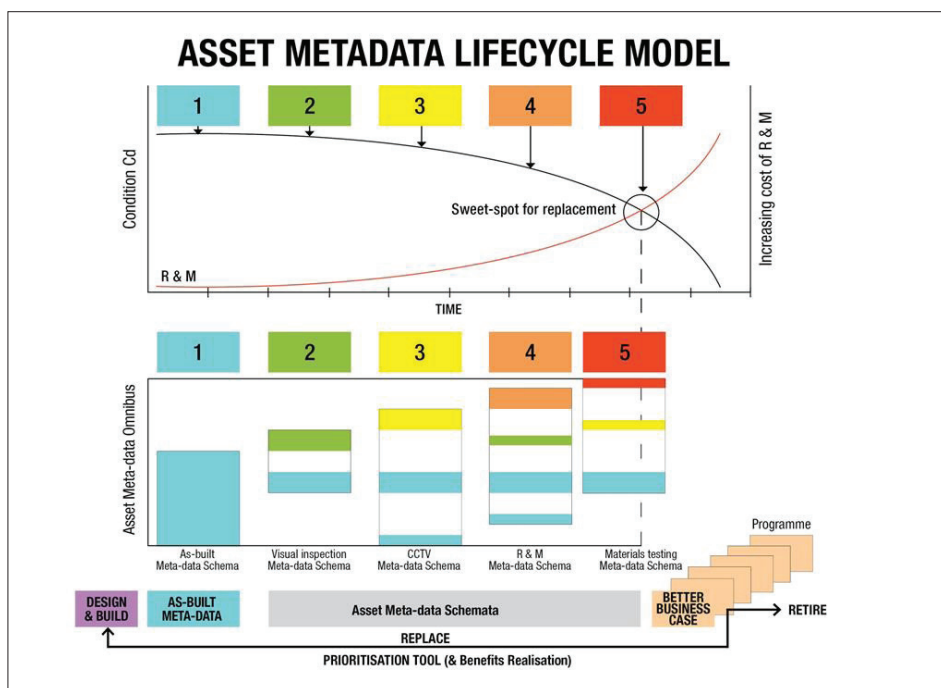
> Asset management is defined as activities carried out to *determine* the *residual life* of an asset (which establishes its condition).
>
> Facilities management is defined as activities carried out to *maintain* the *functionality* of an asset (which establishes the cost of repairs and maintenance).
>
> An asset's *sweet-spot for replacement* is defined as where the *annualised cost of the capital renewal of an asset* (including principal, interest, and depreciation) i*s less than the annual cost to repair and maintain the functionality of an asset.* Note: There is a natural dependency relationship between these two disciplines that will influence the whole of life cost of an asset. A significant dependency on the timing of replacement is demand and criticality.

Deterioration and depreciation in the 31 local authorities

Knowledge about assets and their useful lives is needed for good financial planning

2.54   There are several drivers of asset funding needs, including maintenance, renewals, and building new assets. The depreciation expense reflects asset condition, asset value, and useful life. This affects future rates revenue and other funding requirements.

2.55   Long-term planning for the depreciation expense, which reflects the using up or wearing out of an asset over time, can be difficult. For instance, assessments of the useful life of an asset can change, and assets that property developers vest in local authorities add to a local authority's total assets, changing its depreciation expense.

2.56   Revaluations are important because they reflect changes in the useful life of assets, capital investment in assets critical to service delivery, and depreciation.

2.57   Local authorities typically carry out revaluations to determine an asset's fair value. In general, because of their specialised nature and the lack of a market for most infrastructure assets (such as roading and water supply assets), the best option for local authorities is to use depreciated replacement cost to value their infrastructure assets.

2.58   However, asset revaluations are only as good as the underlying asset data. Valuation cycles and the reliability of, or confidence in, the valuation data varies between local authorities and between asset classes. The reliability of, and confidence in, three waters asset data is more varied for some asset components.

2.59   All but one of the 31 local authorities revalue their infrastructure assets either annually or every three years. Most consider their valuation data to be reliable. This means that most of the data is based on sound records and has been adequately documented. However, the data might have minor shortcomings (such as some old or missing data).

Maintenance and renewals

It helps to know the maintenance you plan so you can recognise the unplanned

2.60   Maintenance requirements are likely to depend on the asset's criticality (consequence of failure), function, geography, environment, and operating procedures. As a general rule, planned maintenance is more cost-effective than unplanned maintenance. It is critical to subcategorise spending on maintenance into planned and unplanned maintenance.

2.61   For local authorities taking "just-in-time" approaches (see paragraphs 2.3-2.4), monitoring planned and unplanned maintenance can indicate where an asset is in its useful life and give an early warning that an asset might be about to fail.

Renewals expenditure to depreciation trend is downward

2.62   Renewals expenditure is the money an asset-intensive organisation uses to maintain its service capacity and capability. It means re-investing in the assets when components reach the end of their useful life and need to be replaced.

2.63   When assets need to be renewed, their costs could be covered by the amounts that have been raised through depreciation charges during the life of the asset. Local authorities calculate depreciation as an even allocation of the consumption of assets because depreciation is mostly a time-based calculation. Renewals expenditure, on the other hand, will not occur evenly during the life of the asset network.

2.64   When we compare renewals expenditure[5] to depreciation, we assume that depreciation is a reasonable estimate of the capital expenditure needed to replace the existing asset base.

2.65   A result where renewals expenditure is equal to depreciation (100%) over time usually indicates that an asset (and therefore service) is sustainable. Figure 9

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5   Clause 3 of Schedule 10 to the Local Government Act 2002 requires local authorities to allocate capital expenditure to one of three primary purposes. Capital expenditure budgeted for two or all of these purposes may be treated as if it were made solely for the primary purpose of the expenditure. Therefore, it is possible that the renewal amounts include aspects of the other two expenditure categories.

shows that local authorities' forecast renewals[6] expenditure on physical assets is below depreciation[7] from 2013 to 2022. It also shows a downward trend during that period.

Figure 9
Forecast annual renewals expenditure as a percentage of the depreciation expense, 2013 to 2022
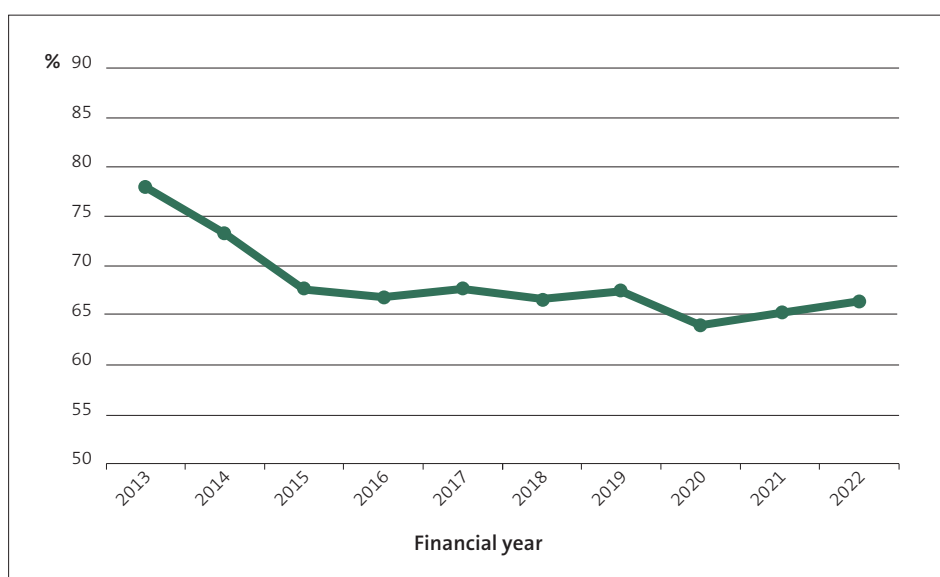
2.66   We have already noted that many local authorities were under financial pressure when preparing their 2012-22 long-term plans. They were looking for ways to manage the affordability of rates, including by delaying renewals work, so they expected assets to last longer than originally anticipated.

2.67   Such approaches should have two consequences: a deferral of renewals to a future period and a decrease in the depreciation expense, reflecting the expectation of a longer asset life. Local authorities might need to confirm that they have appropriately adjusted their forecasts to reflect the later timing of the renewal expense and the assets' increased useful lives.

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6   Renewals are "works to replace existing assets or facilities with assets or facilities of equivalent capacity or performance capability". Depreciation amounts also include amortisation.

7   We took the data for depreciation from local authorities' annual financial statements. The data includes amortisation and depreciation on any new capital expenditure during the year. Adjusting depreciation for these factors does not materially affect the graph or our conclusions.

Renewal rates are better for roading assets than for three waters assets

2.68   Local authorities are more likely to have higher reinvestment (based on renewals expenditure to depreciation) for their roading assets than their three waters assets. Figure 10 shows local authorities' 10-year average renewals expenditure to depreciation by asset class as forecast in their 2012-22 long-term plans.

Figure 10
Ten-year average renewals expenditure to depreciation, by asset class, as forecast in 2012-22 long-term plans

Asset class	Average renewals expenditure to depreciation
Roading	91%
Water supply	72%
Wastewater	58%
Storm water	32%

2.69   Some factors that might influence these different renewal rates include:

- Local authorities receive NZTA subsidies for capital expenditure on roads. Expenditure on three waters assets relies more on rates and other revenue.

- Our industry experts and practitioners estimated that roading assets were closer to the beginning of a renewal cycle than three waters assets.

Many smaller and provincial local authorities are focusing on infrastructure reinvestment more than community and social assets

2.70   Local authorities' spend a large proportion physical assets and capital expenditure on infrastructural assets. However, local authorities might also have significant community and social assets. These other assets typically include art galleries, libraries, museums, public toilets, stadiums, and social housing.

2.71   Figure 11 shows the total forecast capital expenditure for the five infrastructure activities (roading, the three waters, and flood control and protection), and for other activities, from local authorities' 2012-22 long-term plans.

2.72   The proportion of the total forecast capital expenditure on the five infrastructure activities is 65%. Just under half of that proportion (32%) is forecast to be spent on roading activities. The remaining 35% is forecast to be spent on assets for other activities.

Figure 11
Proportion of 10-year 2012-22 long-term plan accumulated total capital expenditure, by activity
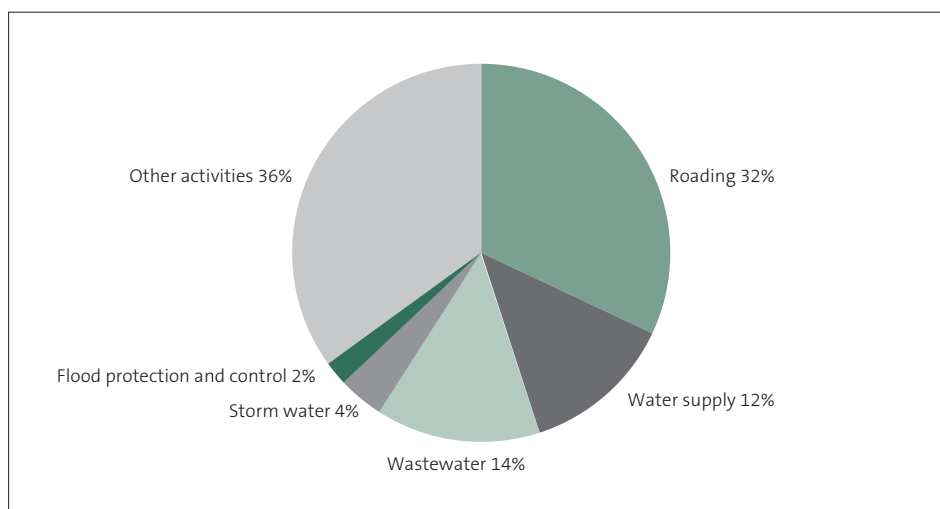
2.73   Large provincial and urban local authorities typically have more, and spend more on, other assets than smaller provincial local authorities. This group of local authorities and their forecast capital expenditure on other activities included Wellington City Council (43%), Selwyn District Council (49%), and Porirua City Council (49%).

2.74   Rural and/or small local authorities were more likely to focus their capital expenditure on maintaining the condition and service levels of roading and three waters infrastructure. This group of local authorities have stable, no, or declining growth. This group includes Southland District Council (5% of their forecast capital spending was on other activities), Clutha District Council (5%), and Central Hawke's Bay District Council (9%).

2.75   As shown in Figure 12, the ratio of renewals expenditure to depreciation for community and social other activities is forecast to decline during the 10 years to 2022. This suggests that local authorities are intending to reinvest comparatively less in those other assets, which typically have a lower useful life than roading and three waters assets. Industry experts and practitioners told us that, if there is a

need to contain costs to lower rate increases, local authorities usually spend less on other assets.

Figure 12
Other activities – forecast renewals expenditure to depreciation
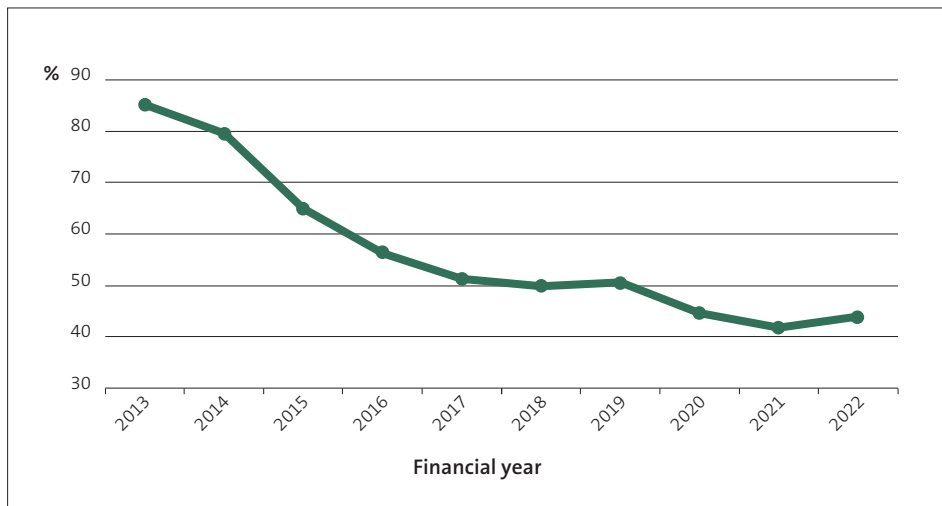
2.76   It is comparatively easier to take a "just-in-time" approach to renewing community and social assets than it is to renewing infrastructure assets. This is because assets such as public toilets, playgrounds, and stadiums are not part of a reticulated network. However, each local authority provides recreation and community assets for residents and ratepayers. Although critical failure of a community or social asset does not affect network performance, these assets can play an important part in the life of local communities. They need to be managed and planned for in consultation with those communities.

Local authorities need to prepare for funding infrastructure renewal cycles

2.77   In Figure 13, we show the accumulated renewals expenditure[8] and depreciation forecast in the 2012-22 long-term plans for all local authorities. These forecasts indicate a "renewals/depreciation gap" – the difference between depreciation expenses and renewals expenditure – of between $6 billion and $7 billion by 2022.

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8   We were unable to obtain the forecast maintenance figures from the 2012-22 long-term plans because local authorities are not required to disclose that information.

Figure 13
Forecast accumulated renewals expenditure and depreciation
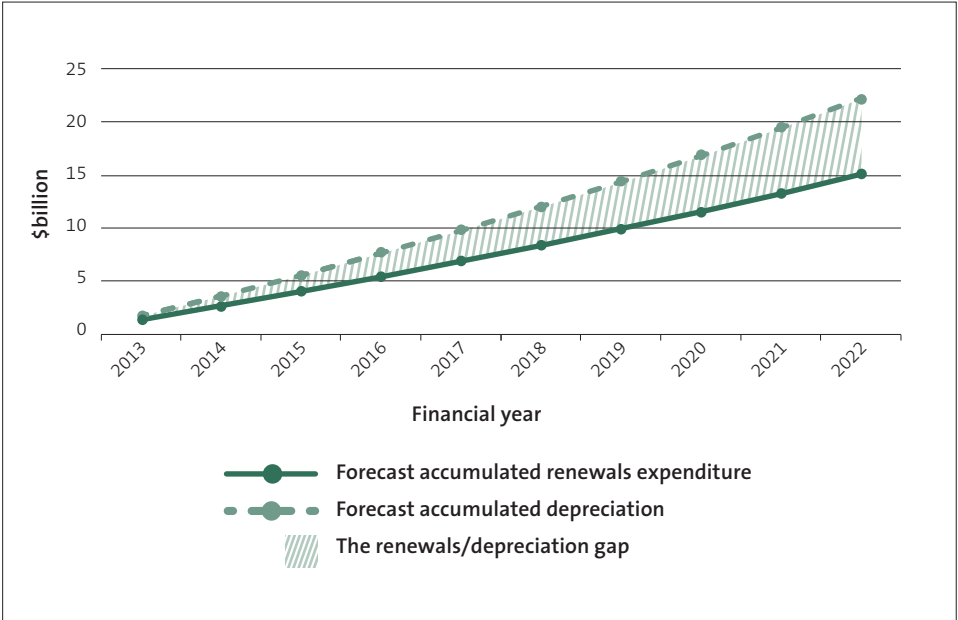
2.78   Because infrastructure assets typically have at least 50 years of useful life, we cannot draw firm conclusions about asset sustainability trends on the basis of 10-year forecast information. Several factors could contribute to the gap between renewals and depreciation. Depreciation could be overestimated (for instance, if local authorities do not review and adjust the useful lives of assets) or there could be changes in prices associated with asset renewal work over time.

2.79   However, the 2011 edition of the *International Infrastructure Management Manual* said that:

> Along with many other countries, New Zealand is facing a looming infrastructure renewal peak which is not well-defined in quantum or timing. What is known is that a significant amount of infrastructure was developed during the 1940's-1970's and is reaching the end of its expected life. However, with much of this infrastructure underground, there is still much debate around what that life expectancy is. Funding the renewal of this infrastructure together with continuing to invest to meet growth requirements will be an ongoing challenge.[9]

2.80   Local authorities could end up relying on rates to fund an infrastructure gap. Better information is needed so any gap can be forecast and managed with more confidence.

9   Page 5/17.

2.81   If depreciation is funded, it could be that funds not directed to renewals in the forecast period are being raised in anticipation of longer-term asset renewal requirements. Industry experts and practitioners told us that:

- many roading assets could be approaching second or third renewal cycles;
- a renewal cycle for bridges is likely to begin around 2025; and
- significant renewals of three waters assets are likely between 2040 and 2060.

2.82   If depreciation funding is being deferred or held back for spending in future years, we would expect to see an associated increase in forecast cash, reserves, or investments, and/or a forecast decrease in borrowing.

2.83   However, as shown in Figure 14, forecast increases in assets, excluding fixed assets, are trending well below the growing renewals/depreciation gap and total debt is forecast to continue increasing.[10]

Figure 14
The renewals/depreciation gap compared to changes in other assets and debt
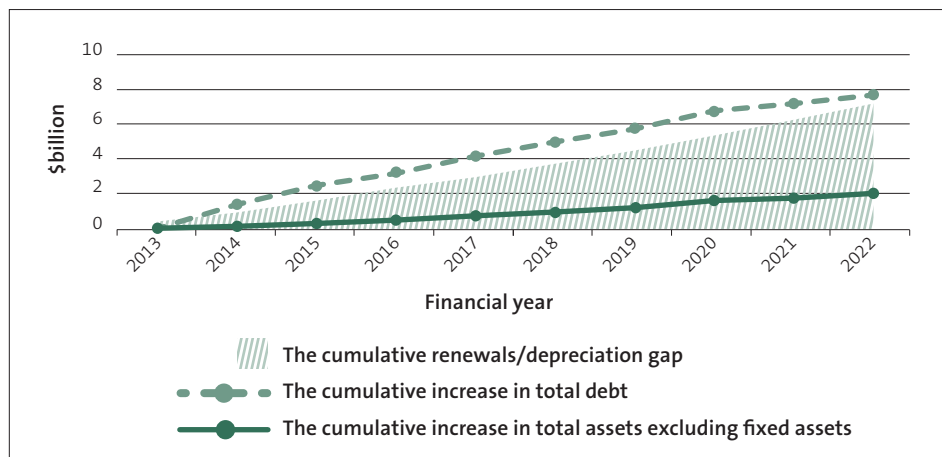
2.84   These forecasts suggest that local authorities could be expecting to use depreciation and/or debt funding on new assets or on other activities within the organisation. If they are, the options for funding the growing renewals/depreciation gap in the future could be limited to rates and/or other income.

2.85   The requirement for local authorities to prepare 30-year infrastructure strategies, if prepared with integrity, will help to explain local authorities' forecast capital reinvestment intentions. This, in turn, will help deliver a more appropriate set of funding options and a more robust long-term financial strategy. The 30-year strategies should start to identify and provide evidence for decision-makers about likely service delivery implications and funding needs for the early 2040s.

10   Christchurch City Council is not included in this data because it was not required to prepare a long-term plan in 2012. Auckland Council's group debt is significant – for each year, it represents more than half of the sector's total debt.

Local government finances – A historical perspective

The following report was prepared for us by the New Zealand Institute of Economic Research. We have included it in its entirety.

Local government finances

A historical perspective

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

Each year NZIER devotes resources to undertake and make freely available economic research and thinking aimed at promoting a better understanding of New Zealand's important economic challenges.

NZIER was established in 1958.

Authorship

This paper was prepared at NZIER by Shamubeel Eaqub, CFA.

It was quality approved by Derek Gill.

Key points

The Office of the Auditor General (OAG) has asked NZIER to paint a broad picture of local government revenue and capital expenditure in a historical context.

We have collated long term data on local government revenue and capital expenditure, spanning over a century.

The past century has been a time of considerable economic progress and change. Some of the same forces of progress are causing population and economic growth to concentrate in some places, but to hollow out in others.

For local government, it matters where people choose to live and work. Local authorities need to plan the operating and capital required for their services and related funding.

Our historical analysis shows that local government income is highly dependent on the legislative mandate set by the Parliament, and strongly affected by fluctuations in central government funding and the overall economic cycle. Local authorities were responsible for a number of public utilities (such as electricity distribution), until reforms in 1989.

Rates have been the most stable source of revenue. Rates have trended higher on a per household and per capita basis, after removing the effects of inflation. But rates are at historic lows relative to the value of the housing stock (the asset base) and have been broadly stable relative to GDP (proxy for income or affordability) since 1945.

Future rates affordability will depend critically on the outlook for population growth, the mix of population (e.g. older versus young, employed versus unemployed) and income growth. Different regions need to plan for quite different futures.

Future rates will need to pay for local government current operations, as well as for capital expenditure on costly long-lived assets. Long term trends show that there have been two big waves of investment, in 1910-1930 and in 1950-1986. These waves were synchronised across different types of assets. Such investments will 'echo' in the future as they come to the end of their useful lives. Understanding these historical echoes will be vital when preparing and planning for significant and costly capital projects. Whether because of these echoes or not, capital investment has been historically low relative to population and income in recent decades. This suggests looming bulge of capital renewals and replacements in coming decades.

An analysis of investments plans (in the data collated by the National Infrastructure Unit (NIU) and Long Term Plans (LTPs)) shows that there is considerable range in forecasts. The certainty of forecasts reduces with time and actual investment is running below forecasts. A key challenge will be developing robust plans that can accommodate a range of plausible future states and enhance the resilience and adaptability to change.

The historical data paints a picture of a changing local government sector over time. Its purpose, role and ways of funding have changed over time. Large capital assets were built in waves which will eventually need costly replacements. Having a realistic and detailed asset management plan, co-ordinated with affordable rates will be important.

Contents

Appendices

Figures

1. A backdrop of changing regional economies

New Zealand is a developed economy but our national averages hide regional differences. Some small towns have few jobs and lower incomes, and life opportunities are not as great as elsewhere. Economic progress is passing some places by. Section 2 presents our one page short story on what is driving diverging demographic and economic outcomes in our regions.

These divergent outcomes matter for the local government sector because local authorities provide services to people which are paid for by those communities largely via rates. The two key drivers of rates affordability are:

- population growth
- income growth and/or economic growth.

Local authorities need to plan appropriately for the population, job and income growth prospects for their regions. Some locations will experience strong population and economic growth, others may be flat and some may contract.

The various scenarios of population and economic growth matter for local authorities. They need to plan for their services expenditure (operating and capital) and the required, related funding.

In the provinces of New Zealand, where population ageing is already a fact of life, some pressures are emerging. Retirees are often asset rich but income poor. Their real incomes are fixed and often they are running down savings. They feel cost increases more acutely. Some local authorities may find themselves in a bind if their residents are unable to pay more in rates, but they still have to maintain roads, drinking water, sewerage and other services to high performance standards.

Ageing may mean that household incomes and rates affordability will be under increasing pressure due simply to demographics. The fastest emerging type of household is 'living alone'; typically older people and those with relatively low incomes. This means that there will be more households relative to population growth, but income per household will not be growing as strongly as before.

If personal income were to hypothetically increase by 2% a year over the next 30 years, household incomes may rise by only 1% a year because of ageing and smaller households. This means that ageing will affect rates affordability.

In the US many local authorities have gone into bankruptcy. We have not found evidence that financial failure has been catalysed by infrastructure failures – but financial distress has led to urban and infrastructure decline.

In the US, local government finances have been blighted by large pension costs – which New Zealand does not have. But this is a short term reprieve. In places with ageing and shrinking populations they may be saddled with too many assets like roads and water treatment plants that will require ongoing maintenance and eventual costly replacement. They may be stranded with assets that become uneconomic burdens. These are long term risks.

Many of the drivers of local economies are not due to local factors. Gales of change are being driven by technological progress, urbanisation, globalisation and ageing. Local authorities need to know their regions and understand the range of plausible futures that must be prepared for. Planning for hoped growth in population and economic activity is not reasonable. History can provide a good guide to the future – although not always (e.g. the recent reversal in population decline in Southland due to international immigration).

Local authorities each need to have a credible asset management plan, that begins with a detailed understanding of their economy, current asset base, future needs and the best financial and asset management strategy to put the plan into effect.

Regions can be organised into various groups depending on the metric used to assess:

- Rates affordability - if required futures rates will be affordable for the local community
- Capital affordability – if required future capital investments can be funded sustainably
  - This would require a good understanding of what is driving the demand for capital assets.
- Three broad groups appear likely:
  - Prosperous <u>and</u> growing places, which <u>will</u> need increasing capital
  - Prosperous <u>or</u> growing places, which <u>may</u> need more capital
  - Poor <u>and/or</u> declining places, which may need to plan for a <u>lower</u> requirement for capital (e.g. divestment, etc.).

Figure 1 Regional economic performance in the 2000s
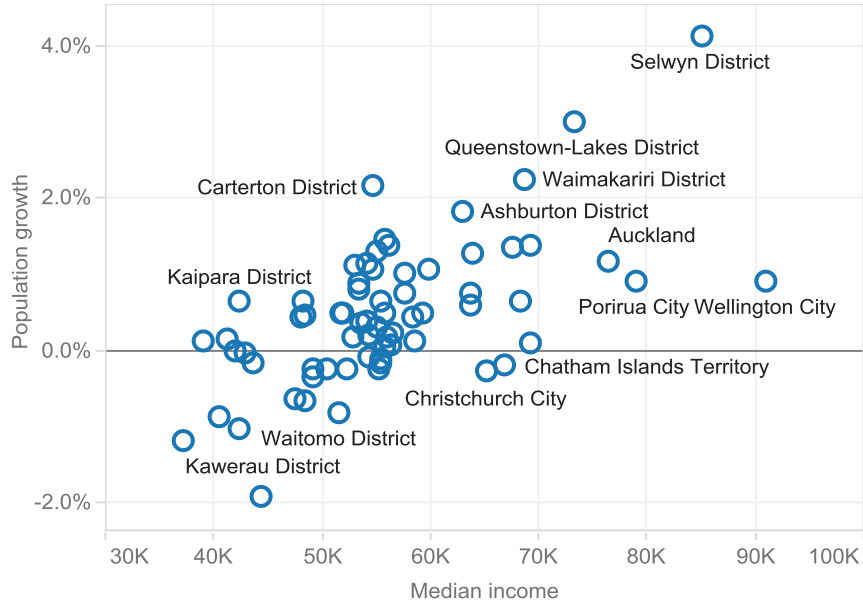
Real GDP per capita 2010, horizontal scale; Compound annual growth rate 2000-10, vertical scale
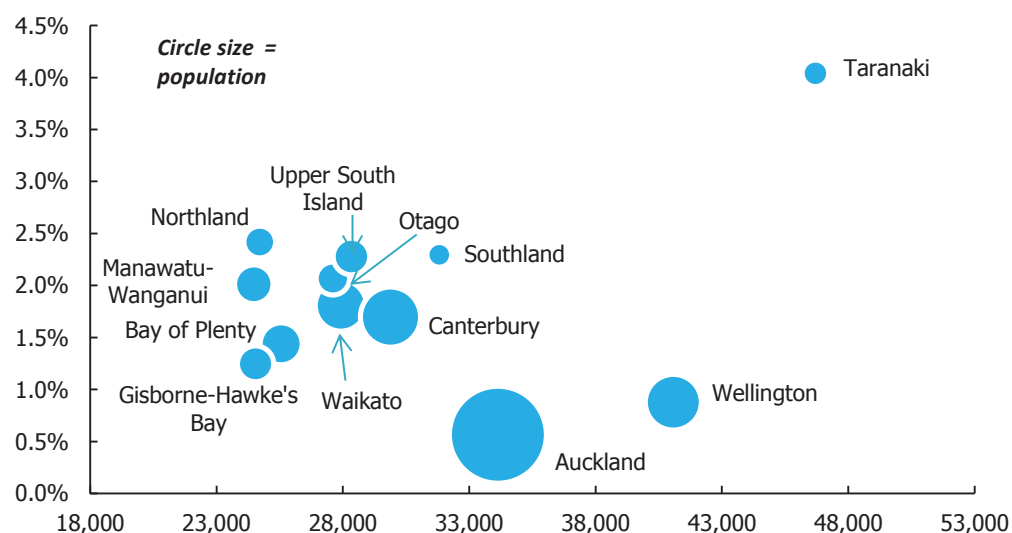
Source: NZIER estimates, Statistics New Zealand data

Figure 2 Different economic states of regional districts

Median annual household income, x-axis; 2006-2013 population growth p.a., y-axis

2. The short story on regional divergence

New Zealand has a highly centralised state, but its regions are not the same. They share some common traits, but performance is diverging across incomes, employment and population.

Over many decades the economic performance of regions has diverged. An example of this is median household incomes, which vary significantly between regions. This has been due to a number of related and self-reinforcing trends: urbanisation, technological change, globalisation and increasingly ageing. These are global forces that are unstoppable and they are speeding up. That means future jobs will be in different industries, occupations and places. These patterns have been evident in other peer countries like the US and UK too.

Figure 3 Median household income by territorial and unitary authority (2013)

Median household income from 2013 Census ($)

30,000 � 110,000
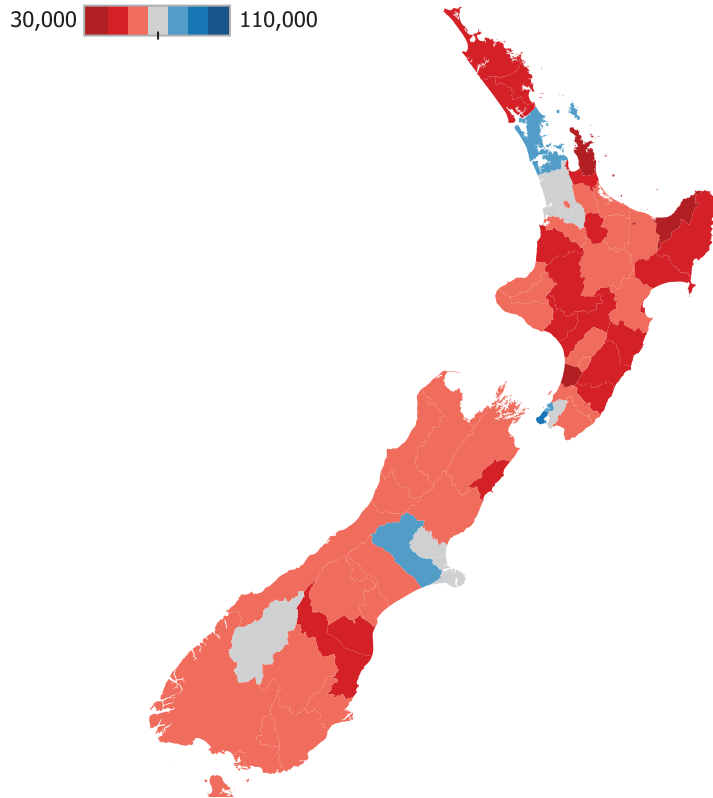
Over recent decades Auckland has created more jobs than other places. This has been because it is a large urban centre that can support highly connected professions like ICT, finance, law, etc. Most of New Zealand's other regions' economies are historically based on agriculture and manufacturing – sectors that are losing jobs. This puts these provinces on the back foot. Figure 4 shows that between 2006 and 2013, employment grew in Auckland because it is in the industries that are growing and Auckland is outperforming other regions. But the story is reversed for many regions, including Northland, Gisborne, Hawke's Bay and Manawatu-Wanganui.

Figure 4 Employment growth by region

Growth rate per year, %, 2006-2013
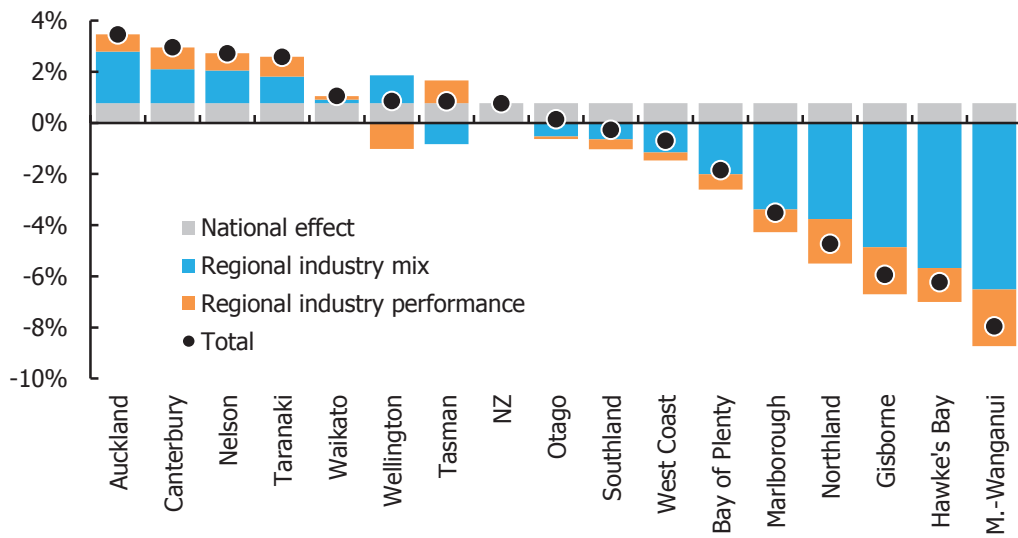
Source: Statistics New Zealand, NZIER

People are voting with their feet, and many small places have declining populations (Figure 5). Fewer job opportunities mean that households cannot aspire to good incomes and lifestyles in many parts of New Zealand. Young people from the provinces are more likely to leave (particularly for overseas) than those from large urban centres. Young people are leaving and the population is ageing, and growing slowly or declining in many parts of New Zealand. This can be a vicious cycle.

Ageing will do many things. There will be fewer workers and entrepreneurs. Demand for goods and services will change – more health services and aged care, but different food and entertainment. Older age groups tend to be asset rich but income poor; they may resist rising local authority rates and service rationalisation.

But not all is lost. Some regions are doing better than others. Places like Southland and Taranaki, which are experiencing strong economic growth supported by a dairy and oil boom respectively, have seen better population growth through migration. Migration has important implications for social and cultural cohesion – a sudden influx can disrupt community trust if immigration is not handled with care and immigrants helped to integrate into society. Paul Collier in *Exodus* suggests a need for the social and economic integration of migrants to reduce the potential risks from immigration and maximise the potential benefits.

Figure 5 Population growth (2006-2013)

Annual growth rate per year, %, 2006-2013

(dark red is -3%; dark blue is +3%)
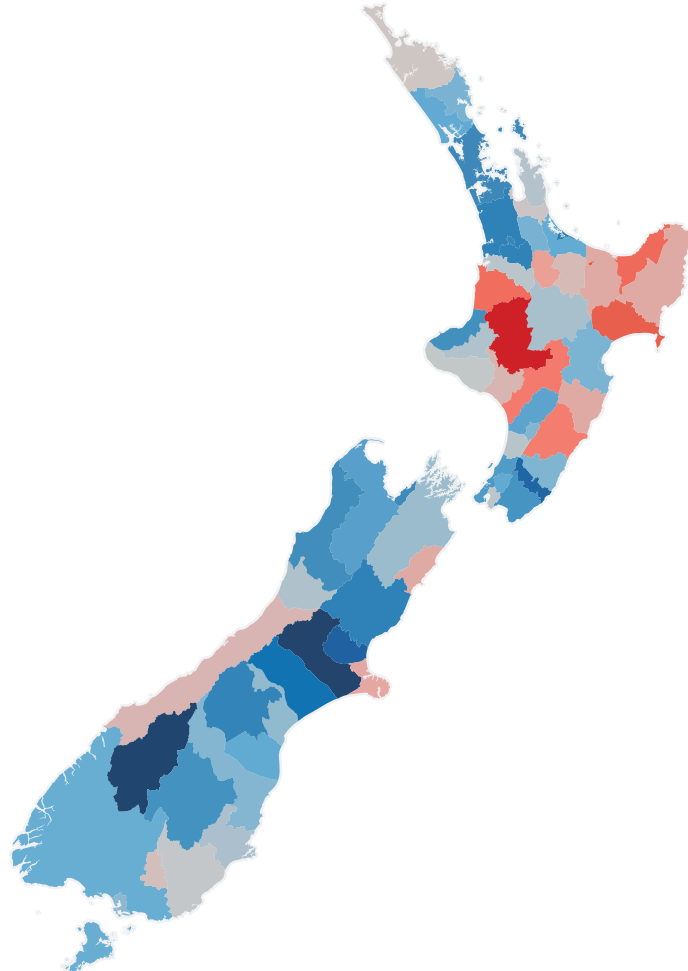
Source: Statistics New Zealand, NZIER

3.   Historical context

The OAG has asked NZIER to develop a narrative for regional economies and the implications for local authorities' revenue and investment plans (particularly for roading and water assets).

In this initial scoping report we have collated long term datasets covering:

- sources of revenue, from 1881-
- investment data (partial), from 1905-
- more detailed investment data, from 1947-
- very detailed investment data, from 2008-

This historical data is helpful in building pictures of investment patterns and to document changes in the local government sector over time. History also gives much needed context, for example 'lumps' in investments that are likely to 'echo' in the future and different natures of investment.

The data should be used with caution, as they are from various sources and span significant changes in how the local government sector was organised, what local authorities did and how they were funded. There is limited historical balance sheet data making the analysis partial. The historical data can be used to paint a broad brush picture of structural change.

4. Revenue

We have collated local government revenue data from 1881 to 2013. Figure 6 shows the sources of revenue over this long time period. The data is shown on a per capita basis and after removing the effects of inflation (because historical data are small in absolute terms).[1]

In 1881 the total receipts for the local government sector was $2 million, compared to $7,880 million in 2013 in dollars of the day. Adjusting for much lower prices in 1881, the 'real' or comparable income in 1881 was $147 million. On a per capita basis, this translates to $281 in 1881 and $1,773 in 2013.

The data on total receipts incorporates a range of changes in the local government sector over time, including the types and quality of services provided by local government controlled organisations. For example, public utilities and related services such as electricity distribution and ports were an increasingly larger source of revenue and operation of local government. But that changed during the reforms of 1989, when many utilities were no longer under the gambit of local government. This is evidence that the local government sector is a creature of central government statute and that local authorities change when the legislation changes (more detail on some of these changes are in Appendix B).
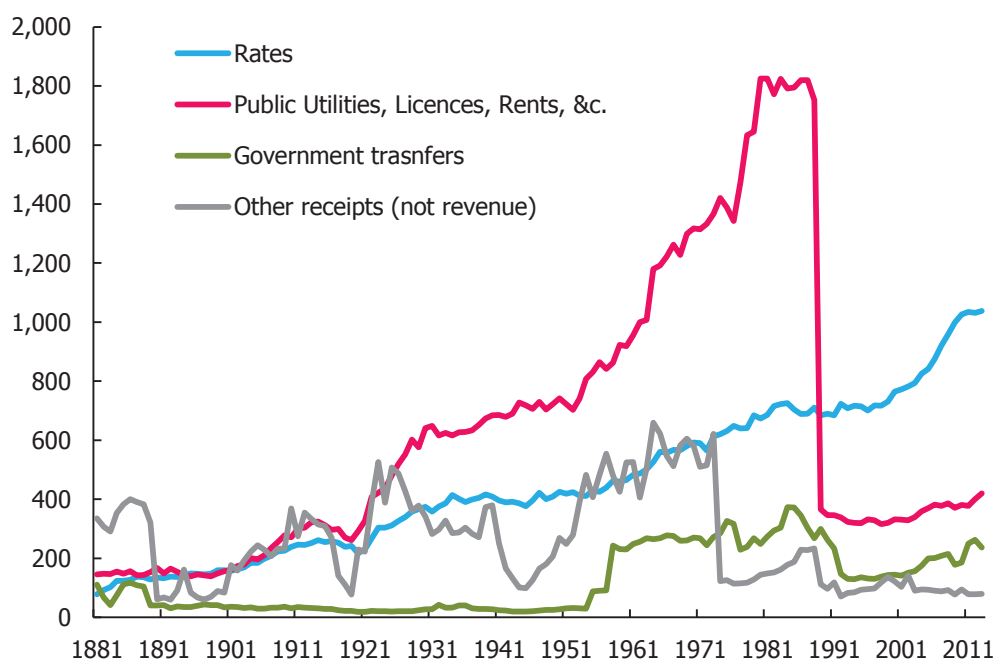
Successive changes in the local government sector's role and the way it is funded is also visible in the data. Government transfers show clear shifts in various phases of the economy, sometimes increasing (for example the inter-war period and during the large 'nation building' phase of the 1950s-1970s) and sometimes decreasing (for example during the fiscal crunch of the 1970s when the New Zealand central government's indebtedness started to increase while it was trying to manage two successive oil shocks within a decade).

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[1] Through this report we have used the CPI as the deflator for general price movements. Deflating spending and revenue by the CPI measures the opportunity cost to taxpayers (but does not measure the real volume of resources used).

Figure 6 Local government receipts (1881-2013)

$ per capita, after removing the effects of general inflation (in 2013 prices)

Source: Statistics New Zealand, NZIER

Through successive reforms rates revenue has remained a steady source of income for the local government sector. Successive reviews of the local government sector have also tended to view rates as a viable and appropriate source of revenue, although there have been changes at the edges around differential rating, rebates and other adjustments.

Rates revenue is typically levied on the value of the housing stock. However, rates affordability is a function of income not the value of houses – although the two tend to be correlated.

Figure 7 shows rates revenue as a share of the housing stock (1923-2013) and as a share of GDP (1881-2013). It shows that rates revenue as a share of the housing stock peaked in 1934, when house prices and economic activity slumped during the 1929 Great Depression. Since then, rates have trended lower relative to the value of the housing stock.

Rates as a share of GDP is a broader measure of rates affordability, as GDP tends to describe household incomes and thus their ability to pay the rates to local government. As context, household disposable income (after taxes and other payables) was around 60% of GDP in 2013. We use GDP in our analysis as there is a longer and consistent history of the data.

Rates have ranged between 2% and 3% of GDP between 1945 and 2013, after trending up between 1881 and 1934. The Great Depression era was impacted by economic contraction, rather than an outsized increase in rates.

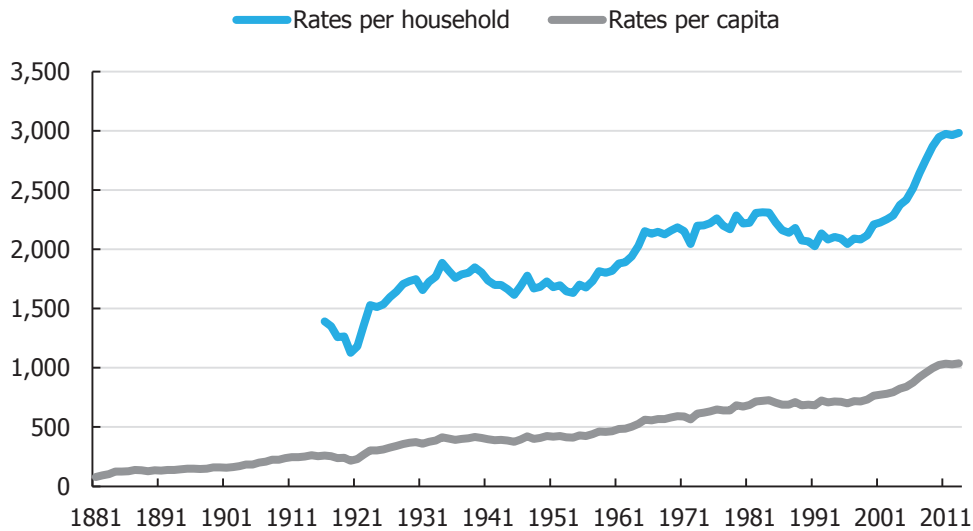## Figure 7 Rates revenue as a share of GDP and housing stock value (1881-2013)

% of GDP and housing stock value
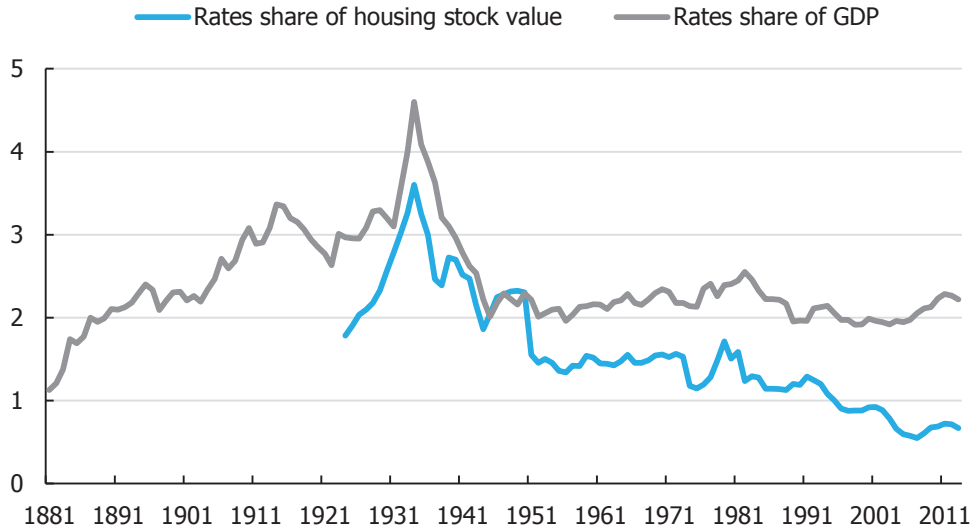
Source: Statistics New Zealand, NZIER

Figure 8 Rates revenue per household and per capita (1881-2013)

$ per capita and per household, after removing the effects of general inflation (in 2013 prices)

Source: Statistics New Zealand, NZIER

To assess the trend in rates, without the influence of changes in housing and economic cycles, we present rates revenue a per capita and per household basis in Figure 8, after removing the effects of inflation. The long term trend in rates is upwards, both on a per household and per capita basis. Importantly, this does not look at changes in the quantity and quality of services provided by local government.

Between 1916 and 2013, almost a century, rates per household have increased by 0.8% per year in excess of general CPI inflation. On a per capita basis, real rates have increased by 1.4% a year. The pace is faster on a per capita basis, as household sizes have shrunk over time, meaning the rates bill is shared across more households.

Shrinking household size means that the growth in households is faster than population growth. This will accelerate over coming decades due to an ageing population – who are more likely to live alone. Understanding of future rates affordability requires careful assessment of who will be making up future households. For example, a retiree living alone on a fixed income will have less ability to absorb rate increases than a young family that can expect their incomes to rise over time with work experience and skill accumulation.

Population decline is also a risk for some local authorities. In the 2013 Census, 20 local authorities had declining populations. In these places, economic and political factors may mean that rate increases cannot be implemented.

5.   Capital expenditure

We have collated indicators of local government capital expenditure from 1905 to 2013. Data prior to 1962 are only partial, based on central government loan approvals for local government projects, which may have been part funded or may not have been done. While the data is partial, it is nevertheless useful for understanding the nature of the investment cycles for long-lived assets.

Figure 9 summarises our capital expenditure indicators for roads (which has good data available and has been collated by the Ministry of Transport) and a catch-all 'other' capital expenditure. The figure shows a clear pattern of eras of investment with intermittent pauses.

Some assets such as water networks can have useful lives of 100 years or more. That means if investments were 'bunched' in history, their costly renewal and replacement may also 'echo' in similar bunches in the future.

The historical data is not available in sufficient and consistent detail to paint a definitive picture of local government investment. We use partial indicators to add colour.

There are two clearly identifiable surges of investment in 1920-1930 and long boom in investment from 1950-1986 for non-road investments – although with considerable volatility. Investment in roads peaked in around 1965, then trended lower until 1990. Investment in roads trended higher between 1990 and 2013.

Figure 10 shows the borrowings by local government between 1905 and 1968 for various types of capital investment. The figure shows that the different types of capital investment have tended to be synchronised, suggesting that future renewal and replacement may also be similarly bunched. Or it suggests that we will hit 'block obsolescence' as many capital assets reach the end of life at the same time.

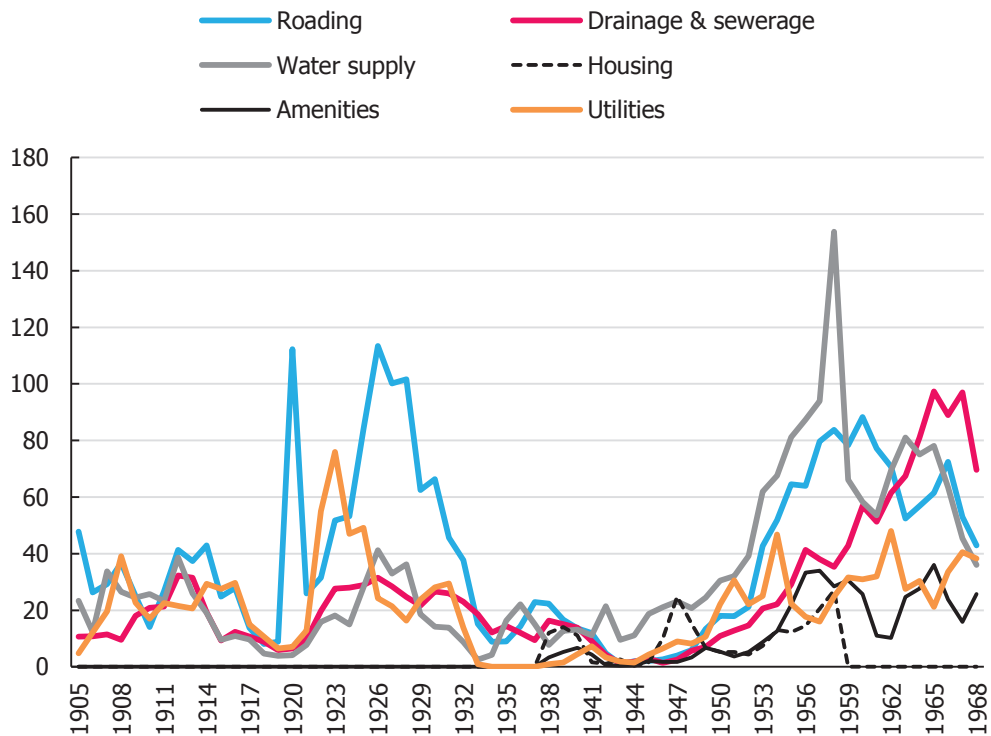## Figure 9 Local government capital expenditure indicators (1905-2013)

$m per year, after removing the effects of general inflation (in 2013 prices)
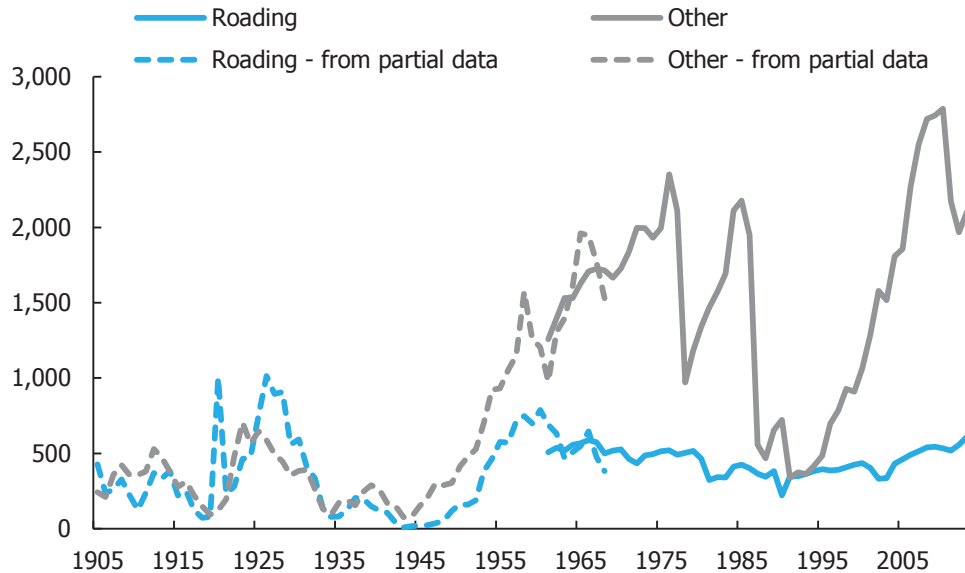
Source: Statistics New Zealand, NZIER

Figure 10 Local government borrowing for different types of capital expenditure (1905-1968)

$m per year, after removing the effects of general inflation (in 2013 prices)

Source: Statistics New Zealand, NZIER

The investment in capital in the 1905-1968 period in Figure 11 appears to be largely in capital expansion or the building of new capacity. This is consistent with available New Zealand historical literature and feedback from industry experts.

Consistent data for the 1973-2013 period shows that a broad pattern of capital accumulation has continued, with capital expenditure outstripping economic depreciation (or consumption of fixed capital) for much of this period. The only exception was 1987-1996, when investment was below depreciation – suggesting this was a period of sustained 'under-investment'.

Figure 11 Investment and consumption of fixed capital (1973-2013)

$m per year
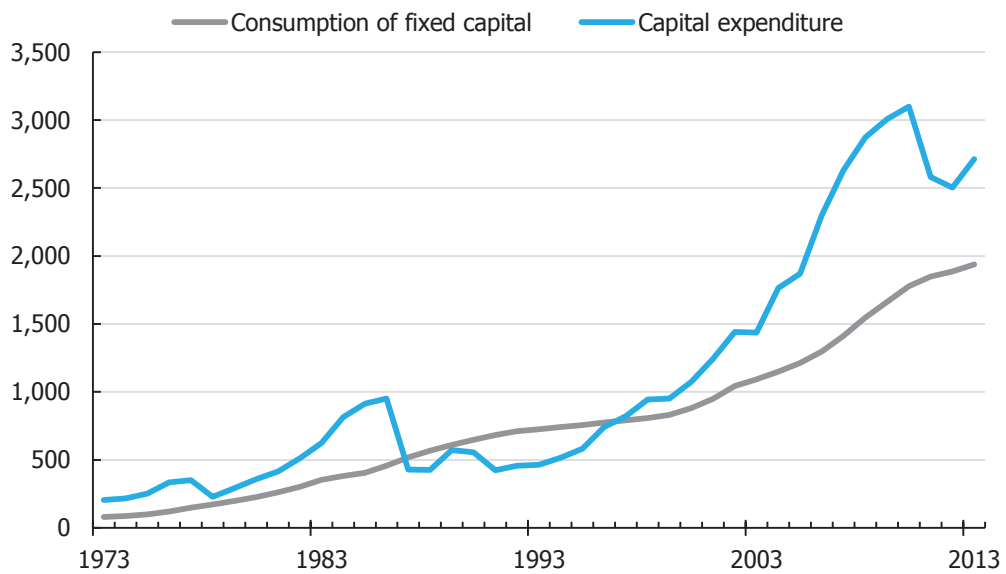
Source: Statistics New Zealand, NZIER

6.   Where the capital is spent

More recent data on the components of capital expenditure is more difficult to access. The data is not always reported in a consistent format and official data is at an aggregated level.

Figure 12 shows the components of expenditure over the decade to 2012. Waste water (24%), roads and bridges (21%) and water supply (8%), together account for just over half of all capital expenditure. However, this leaves a sizeable 47% of assets lumped into an unexplained 'other'.

Figure 13 shows a little more detail from a partial data source: an unpublished level of detail in a Statistics New Zealand survey. This data is not consistently reported by respondents and should be used as an indication only. This figure shows that other investment is broadly dispersed across a range of activities from software to social housing and is not as easily grouped as the large areas of expenditure: roads and bridges, storm water, sewerage and drinking water.

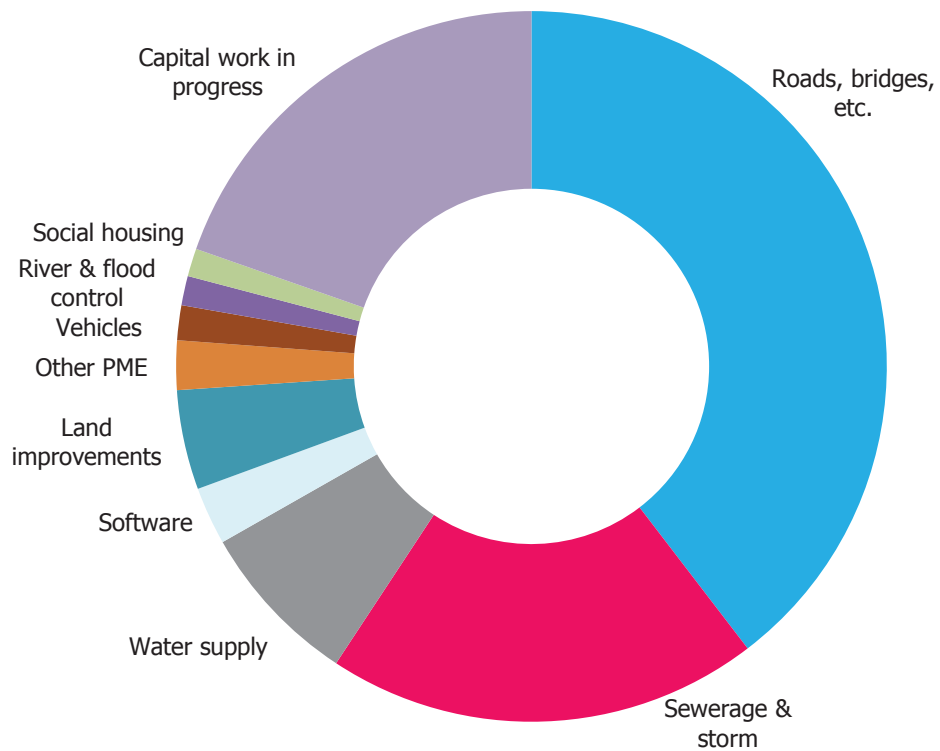## Figure 12 Local government additions by fixed assets (2003-2012)

Additions to fixed assets for 2003-2012 cumulative

Waste water
24%

Water supply
8%

Roading
21%

Other investment
47%
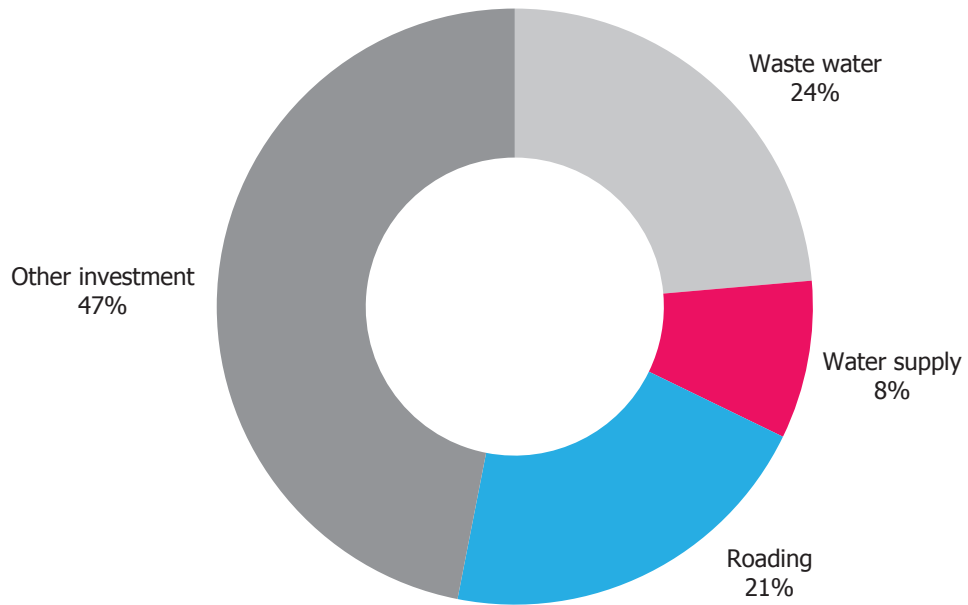
Figure 13 Local government additions by detailed fixed assets (2008-2012)

Additions to fixed assets for the top 10 classes of fixed assets, 2008-2012 cumulative

Capital work in progress

Social housing
River & flood control
Vehicles
Other PME
Land improvements
Software
Water supply

Roads, bridges, etc.

Sewerage & storm

7.   Plans versus action

We use the following framework to think about investment plans. This is a broad frame and we have not populated this, as there is insufficient data at the macro level to understand the motivation for each type of investment (replacement versus maintenance for example).

**Figure 14 Stylised map of drivers of investment**
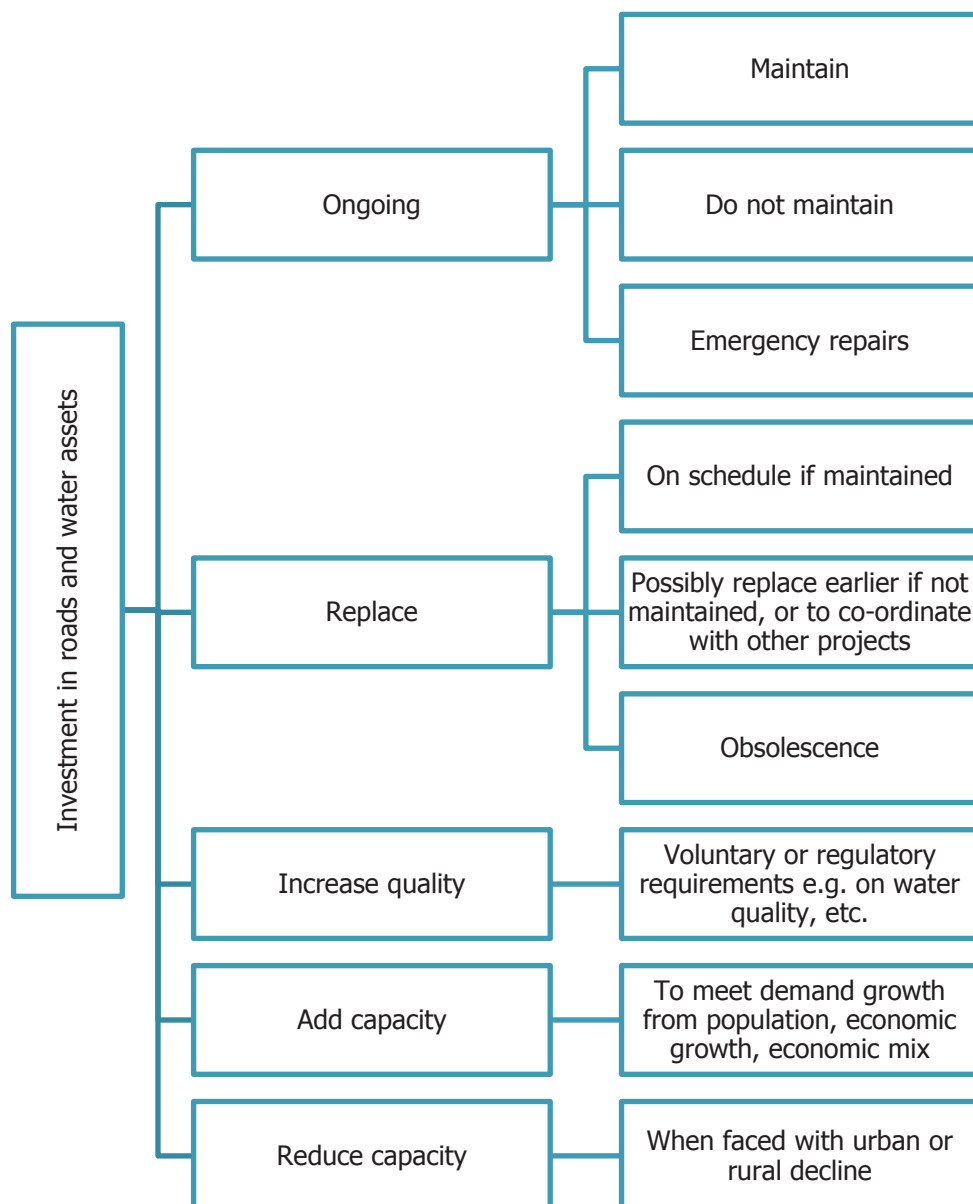
We have looked at projected spending patterns in the Long Term Plans (LTPs) and self-reported capital intentions to the National Infrastructure Unit (NIU). Our analysis suggests that the bottom up investment plans do not appear to fully match up with the totals presented in the LTPs. This requires further exploration, as it may hint at a

lack of detailed planning, forecasting bias due to the bow wave effect or normal forecast uncertainty.

Figure 16 shows analysis of LTPs by the OAG. It illustrates that the actual investments recorded in annual reports are quite different from that forecasted in earlier annual reports and in successive LTPs. This analysis suggests that capital planning has considerable variation and uncertainty.

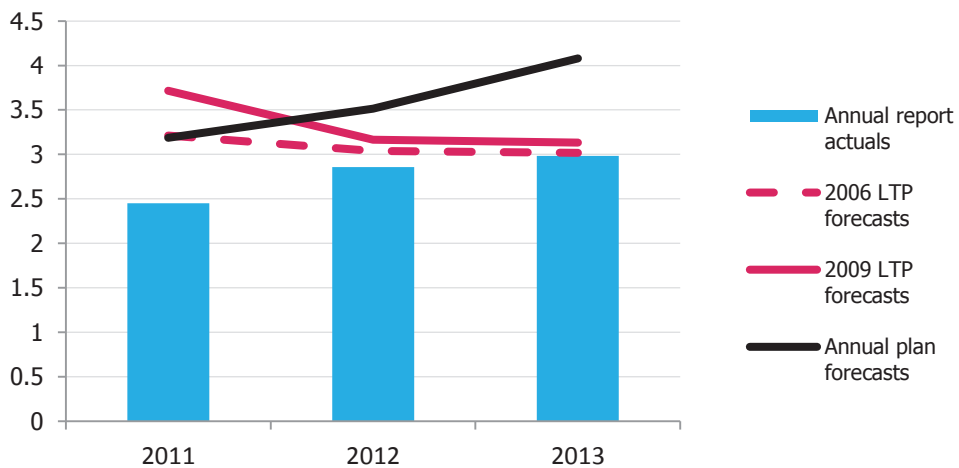## Figure 15 Local government self reported capital expenditure plans

2012$m, estimated from intentions
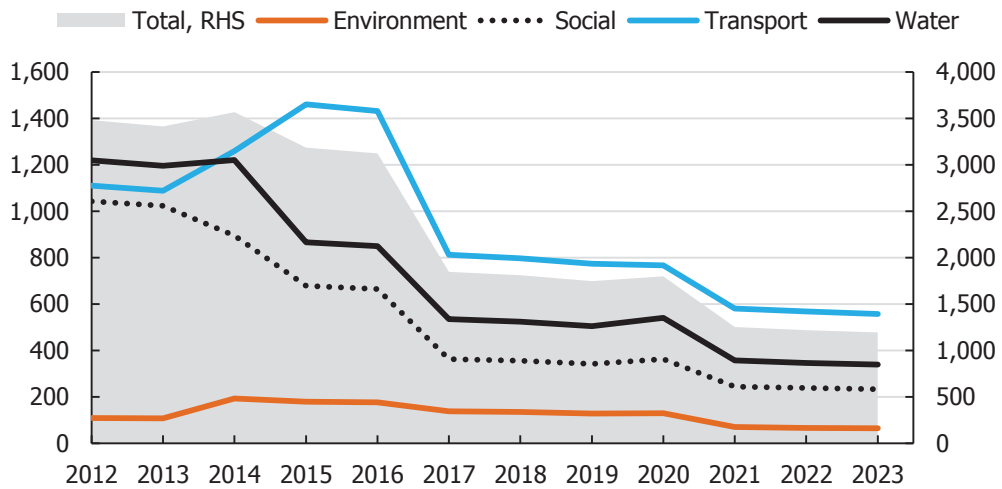
Source: NIU, NZIER

Figure 16 Local government capital expenditure: planned and actual

$b per year
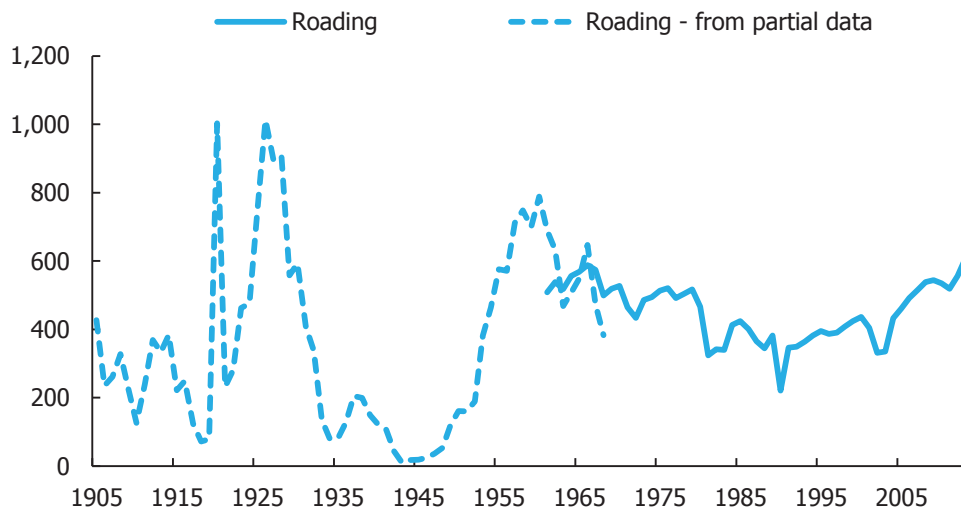

Source: OAG analysis of Long Term Plans

Appendix A Long term investment trends

Figure 17 Local government spending on roading (1905-2013)
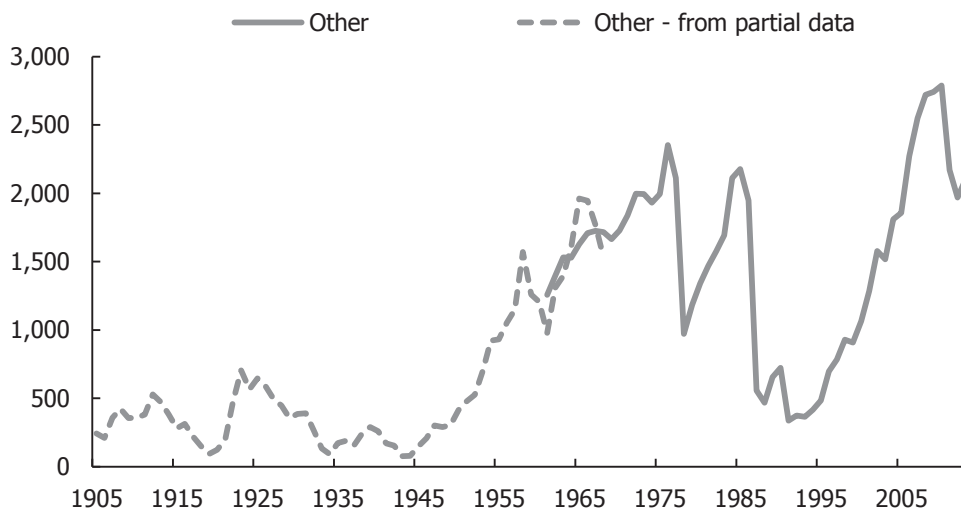
$m per year, after removing the effects of general inflation (in 2013 prices)

Figure 18 Local government spending other than roading (1905-2013)

$m per year, after removing the effects of general inflation (in 2013 prices)

Appendix B Local government rates and investment history

The following extract from the 1990 New Zealand Official Year Book[2] provides a helpful historical narrative.

Roads and drains always built with rates

Rates are property taxes levied by local authorities to pay the wide range of services they provide. They have been used in New Zealand since the earliest days of European colonisation.

Early rating

Early colonists based the first rating systems on those they knew in England. These were a variant of annual rental value rating. In 1842 a Municipal Corporations Ordinance was passed which stipulated that any district with a population of 2000 or more would become a borough and would have a council with the power to make rates. It only affected Wellington, since in 1842 it was the only district with a population of that size. As local government evolved in New Zealand, the 1842 ordinance was replaced piecemeal by other ordinances.

There was also a brief period from late in 1844 when the Customs Tariff was replaced by property rates as the main source of central government finance—but the scheme was a resounding failure and the tariff was soon restored.

The Constitution Act of 1852 had a major effect on New Zealand politics, not only did it bring responsible government it also established six provinces. Each province had the power to raise funds by rates, and initially the annual rental value system was used.

However, using the property's annual rental value to set the rates was seen by some as discouraging development of land. The 'system rated settlers who worked hard to improve their land more heavily than those who left the land undeveloped. There were also fears that speculators would exploit the situation.

In some parts of the country attempts were made to make the system more equitable by shifting to the 'capital' or the 'land value' system of rating. These systems emphasised the price that each property would bring on the market rather than the rent it might gain. This meant a measure of the potential value of the land for development was included, not just the amount of work that the owner had put in.

From the 1860s central government became concerned that there were enormous disparities in the services provided by local authorities, and in response it established some basic standards of service provision. The Municipal Corporations Act 1867 set out compulsory functions and model bylaws for each town or district, but did not affect rural New Zealand. The municipal corporations were obliged to raise more funds to pay for their compulsory services.

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[2] Statistics New Zealand, available at http://www3.stats.govt.nz/New_Zealand_Official_Yearbooks/1990/NZOYB_1990.html.

Around the same time central government decided to institute standard procedures for the rating of Maori land. Under the Treaty of Waitangi, Maori were to be treated as British citizens, and landowners had an obligation to pay rates, but in recognition of the different land ownership system for Maori a separate legal body was established to settle land disputes, including rating. The Native Land Act 1865 established the Native (Maori) Land Court. Among the powers of the court was that it could recommend to the Governor that he issue an Order in Council exempting any Maori freehold land from all or part of its rates. The court could also assist local authorities to recover unpaid rates debts on Maori land.

After the provinces 1876–1920s

The provinces were abolished in 1876 and replaced by counties, municipalities (towns and districts) and road boards. Following abolition, rating was rationalised to provide local government with a unified system of rating. The Rating Act 1876 made the annual rental value system universal. Each local body was also required to appoint a valuer to prepare a valuation roll.

Concerns about property speculators exploiting the annual value rating system resulted in a new Rating Act being introduced in 1882. This act replaced the 'annual rental value' system with the 'capital value' system. It also transferred valuation powers from local authorities to central government property tax assessors to ensure more consistent standards of valuation throughout the country. Many boroughs opposed the changes, and in response government decided to allow some authorities exemptions from having a capital value rating system or from using government valuers. Subsequent amendments to the law gave local authorities a choice of annual rental or capital value. In 1896 a partial unimproved value rating system was brought in. This was extended to full unimproved value rating in 1912, and many local authorities changed rating systems during this period.

Between the wars

The 1920s were a period of gradual expansion in New Zealand. Between 1920 and 1930 rates revenue almost doubled. By the 1930s government had instituted many measures to co-ordinate local authority planning, borrowing, roading and expenditure. Acts like the Main Highways Act 1922, the Town Planning Act 1926, the Local Government Loans Board Act 1926 and the Housing Act 1935 expanded the role of local government. Government also provided some finance to pay for these compulsory functions with grants, subsidies and loans.

As the Depression began to take hold, many plans for developments such as civic centres were delayed, although local authorities became employers of many people under Unemployment Board subsidies—often on roading and other 'minimum cost' public works. Between 1930 and 1945 rates paid to local authorities increased by only 31 percent.

The post-war years

After World War II central government undertook many reviews of local government structures and finance. A number of these reviews resulted in minor changes to rating legislation.

All three systems of rating continued to be used side-by-side. Reviews also reaffirmed that 'rating should continue to be the basis of local government taxation'.

Repeated reviews raised concerns that rating should be equitably applied. In 1970, the Counties Act was amended to allow differential general rating, and this requirement was later

included in the Municipal Corporations Act 1954. Under 'differential rating' a local authority could have different levels of rates for different types or groups of property. This allowed a higher proportion of rates to be levied on properties making greater use of services, such as commercial and industrial properties. The Rates Rebate Act 1973 was brought in to reduce the rating burden for landowners living on low incomes, retired people and widows. The Act provided for rates rebates which were paid back to local authorities by central government.

Recent years have seen further simplification of rating legislation. The Rating Powers Act 1988 laid down how a rating system should be run by any type of local authority whether it be city council or catchment board.

In October 1989 central government completed a major reorganisation of local government, including its structures, functions and finances. A related review of local government finances concluded in 1989 that rating should remain the main method of funding for local authorities.

Appendix:
Local authorities selected for asset management review

The 31 territorial local authorities whose asset management we reviewed are listed below. In addition, we applied our methodology to Watercare and Auckland Transport because these two subsidiaries are responsible for water supply and wastewater services, and roading, in Auckland – rather than Auckland Council itself.

Ashburton District Council	Auckland Council (Auckland Transport and Watercare)
Central Hawke's Bay District Council	Clutha District Council
Dunedin City Council	Far North District Council
Gisborne District Council	Hamilton City Council
Hastings District Council	Horowhenua District Council
Hutt City Council	Kapiti Coast District Council
Marlborough District Council	Napier City Council
Nelson City Council	New Plymouth District Council
Porirua City Council	Queenstown-Lakes District Council
Rotorua District Council	Selwyn District Council
South Waikato District Council	Southland District Council
Taupo District Council	Tauranga City Council
Thames-Coromandel District Council	Timaru District Council
Waimakariri District Council	Waipa District Council
Wellington City Council	Whanganui District Council
Whangarei District Council	

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Other publications issued by the Auditor-General recently have been:

- Accident Compensation Corporation: Using a case management approach to rehabilitation
- Challenges facing licensing trusts
- Annual Report 2013/14
- Ashburton District Council: Allegations of conflicts of interest affecting decisions on a second bridge
- New Zealand Transport Agency: Maintaining and renewing the state highway network — follow-up report
- From auditor to soldier — stories of the men who served
- Accident Compensation Corporation: How it deals with complaints
- Ministry of Social Development: How it deals with complaints
- State-owned enterprises: Results of the 2012/13 audits
- Public entities' progress in implementing the Auditor-General's recommendations 2014
- The Auditor-General's strategic intentions 2014/15 to 2017/18
- Annual Plan 2014/15
- Setting up Central Agencies Shared Services
- Watercare Services Limited: Review of service performance
- Local government: Results of the 2012/13 audits
- Inquiry into the Plumbers, Gasfitters, and Drainlayers Board: Follow-up report
- Reflections from our audits: *Our future needs — is the public sector ready?*

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